IN THE

Supreme Court of the United States

October Term, 1976

No. 76-488

ROANWELL CORPORATION

Petitioner,

v.

PLANTRONICS, INC.

Respondent.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SECOND CIRCUIT

APPENDIX

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I N D E X

Appendix A

the Middle District of stores of all three corporate defendants and the good probability of the existence of witnesses to the alleged confusion between plaintiff and defendants' business names. Furthermore, the District to which the defendants would have this action transferred is not so convenient to both parties that a transfer would be justified over the plaintiff's opposition. Neither does it appear that this suit would achieve a more expeditious resolution in the Southern District of New York, since the trial docket there is heavily burdened.

[2] Defendants' motion to compel discovery seeks production of the identities of all the interviewees in a survey taken within the Middle District by an attorney for plaintiff. In addition, the motion seeks discovery as to the manner of selection of the prospective interviewees, the facts surrounding the initial approach to the interviewees and the identity of the persons who stated in the interviews that they were not confused by the allegedly too-similar corporate names. This Court is of the opinion that the plaintiff is not obliged to reveal these identities nor the circumstances surrounding the interviews. This is an area which the Court feels is protected by the work product doctrine as enunciated in Hickman v. Taylor 329 U.S. 495, 91 L.Ed. 451 (1947). However, the plaintiff is clearly not entitled to maintain as secret the identities of those witnesses intended to be called at trial. The Court is of the opinion that these latter names and addresses should be made available to defendants' counsel sufficiently prior to the pre-trial conference so as to permit defendants to interview the witnesses or take depositions from them. It is, therefore

Ordered that the motion to transfer filed by defendant be and is hereby denied; it is further

Ordered that the defendants' motion to compel discovery be and is hereby denied, but plaintiff's counsel shall make available to defendants' counsel the names and addresses of all those witnesses whom plaintiff intends to call at trial at least twenty (20) days prior to the date scheduled for the pre-trial conference; and it is further

Ordered that the pre-trial conference be and is hereby rescheduled for 10 AM, the 20th day of October, 1975, and the non-jury trial of this cause is rescheduled for Tuesday, the 28th day of October, 1975, at 9:30 A M in order to allow the parties sufficient time for the completion of discovery in this case.

Supreme Court of the United States

Kahn v. Dynamics Corporation of America

No. 74-1016 Decided Apr. 21, 1975

Petition for writ of certiorari to Court of Appeals for the Second Circuit denied.

Opinion below: 184 USPQ 260 (Pat. No. 3,030,503).

District Court, S. D. New York

Plantronics, Inc. v. Roanwell Corporation

72 Civ. 1625 Decided Mar. 18, 1975

PATENTS

1. Defenses—Fraud (§30.05)

British patent obtained by fraud will not bar enforcement of corresponding United States patent.

2. Defenses—Fraud (§30.05)

Fraud in obtaining one patent will not render other patents in common ownership unenforceable, even if patents cover closely related inventions.

3. Pleading and practice in courts—Issues determined—In general (§53.501)

Court declines to decide whether anti-competitive provision of licensing agreement is patent misuse where misuse is dissipated.

Action by Plantronics, Inc. against Roanwell Corporation for patent infringement. On plaintiff's motion to strike. Motion granted.

Arnold, White & Durkee (Tom Arnold and Paul Janicke, of counsel), all of Houston, Tex., and Brumbaugh, Graves, Donohue & Raymond (Robert Neuner, of counsel), both of New York, N. Y., for plaintiff.

Cooper, Dunham, Clark, Griffin & Moran (Lester W. Clark and Charles W. Bradley, of counsel), all of New York, N.Y., for defendant.

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Conner, District Judge.

This is an action for infringement of three U.S. patents owned by plaintiff and relating to lightweight headsets of the type used by airplane pilots and air traffic controllers for voice communications. Plaintiff has moved to strike Paragraph 17 and a portion of Paragraph 18 of defendant's Answer, which allege, by way of affirmative defense and counterclaim, that the patents in suit are invalid and unenforceable because of plaintiff's "lack of candor and fraud" in securing corresponding foreign patents without calling to the attention of the foreign patent offices prior art and other bars known to plaintiff which precluded the grant of such patents, and because of plaintiff's misuse of the patents in suit by granting licenses under the corresponding foreign patents knowing them to be invalid.

I.

In support of the fraud allegations, defendant relies specifically upon the non-convention application for a British patent corresponding to the earlier utility patent in suit. This British application was not filed until August 25, 1964, almost 3 years after the filing of the corresponding U.S. application, during the negotiation of a license agreement, entered into February 5, 1965, by which plaintiff granted S. G. Brown Ltd. an exclusive license to make and sell the invention in Great Britain and five other European countries during a five-year term, once renewable, and by which plaintiff undertook to "seek patent coverage."

It has since been conceded that before the British application was filed, internationally circulated trade publications containing plaintiff's advertisements of the patented headsets had reached Great Britain. Plaintiff's former patent attorney testified on deposition that he advised plaintiff's then president, who is also the patentee of the U.S. patent involved, that this constituted a bar against obtaining a valid British patent. While plaintiff denies this testimony and belittles it as that of a "disgruntled former employee," it surrendered the British patent in 1974, some nine years after its issuance.

[1] Even assuming, without deciding, that the British patent was obtained by fraud, this would not bar enforcement of the corresponding U.S. patent here in suit.

As the U.S. Supreme Court stated in Loughran v. Loughran, 292 U.S. 216, 229 (1934),

> "Equity does not demand that its suitors shall have led blameless lives."

[2] Thus, as I stated in Saxton Products, Inc. v. United States Telephone Co., 182 USPQ 608, 609 (S.D.N.Y. 1974), the courts have consistently ruled that fraud in obtaining one patent will not render unenforceable other patents in common ownership, even where the patents cover closely related inventions.

For example, in Beckman Instruments, Inc. v. Technical Development Corp., 433 F.2d 55, 167 USPQ 10 (7th Cir. 1970), cert. denied, 401 U.S. 976, 169 USPQ 65 (1971), the plaintiffs sought a judgment declaring the invalidity of a group of patents which had been licensed by the defendant to the plaintiff. The basis of the action was the alleged fraudulent procurement of one of the licensed patents. The court ruled that although the patents were of sufficiently close relationship to be included within the same licensing agreement, fraud in the procurement of one of the patents did not affect the others. The court stated that,

> "if the [patent in suit] * * * is shown to be invalid, it cannot be the basis for royalties, but that does not render the entire licensing agreement an improper attempt to use patent leverage to extend the scope of the patent monopoly." 433 F.2d at 62, 167 USPQ at 15.

Noll v. O. M. Scott & Sons Co., 467 F.2d 295, 175 USPQ 392 (6th Cir. 1972), cert. denied, 411 U.S. 965, 177 USPQ 545 (1973), was an action charging the defendant with infringement of a basic patent on a crabgrass control chemical by the sale of a specific chemical known as "AMA." The defendant contended that the plaintiff was estopped from bringing such an action because in a prior application for an improvement patent it had represented to the Patent Office that AMA possessed properties unexpectedly superior to those disclosed in the basic patent, and that this representation was inconsistent with the plaintiff's present contention that the basic patent is infringed by the sale and use of AMA. Despite the close relationship of the two inventions—a generic invention and an "improvement" within the scope thereof—the court, assuming *arguendo* that the representations to the Patent Office during prosecution of the later application were false, noted that such conduct would not render the basic patent unenforceable but,

> "could only invalidate the patent in whose applications the assertions were made.* * * There can be no defense based on ' "Misuse in the air." The misuse must be of the patent in suit.' Kolene Corp. v. Motor City Metal Treating, Inc., supra, 440 F.2d at 85, 169 USPQ at 82-83.* * * " 467 F.2d at 302-303 n.6, 175 USPQ at 398.

S. H. Kress & Co. v. Aghnides, 246 F.2d 718, 113 USPQ 395, (4th Cir. 1957) involved a situation factually indistinguishable from that at bar. In that case, plaintiff charged infringement of a U.S. patent based on an application filed under the International Convention claiming the benefit of the filing date of a prior application in Belgium, asserting that the U.S. and Belgian applications covered the same invention. The defendant offered to show that the plaintiff had previously represented to the Canadian Patent Office that the corresponding application which he filed there did not cover the same invention as the Belgian application. Thus, the alleged fraud was perpetrated in connection with an application for a Canadian patent on the same invention covered by the U.S. patent in suit. The court ruled that such fraud, even if proven, would not bar recovery on the U.S. patent, stating:

> "Whether or not on another occasion [plaintiff] * * * made an inconsistent claim in Canada to obtain a patent there, is an issue that we need not decide. If he made a misstatement there, this might bear upon the validity of his Canadian patent. It would not alter the fact that what he told the United States Patent Office was the truth and that the patent here was obtained without deception or fraud. Even if we were to assume what we are not prepared to adjudicate, that the inventor's representations to the Canadian Patent Office were untrue, this misconduct would not be so closely related to the proceedings in this country and the issuance of the patent to him here as to invalidate the grant or to constitute such unclean hands as to disentitle him to the relief he asks in this case." 246 F.2d at 725, 113 USPQ at 400-401.

Defendant's allegation of fraud by plaintiff in the procurement of the British patent corresponding to one of the three U.S. patents in suit thus does not state an affirmative defense, even if fully proven.

II.

The only substantial argument made by defendant in support of its allegation that the U.S. patents are unenforceable because plaintiff granted licenses under the British patent knowing it to be invalid, is based upon the fact that the license agreement provided that S. G. Brown Ltd., the licensee,

> "agrees not to export Licensed Products outside the Licensed Territory without prior written approval from [plaintiff]."

"Licensed Products" was defined as "Headsets, Assembly Parts and Replacement Parts." "Headsets" was defined as "All models and types of headset products manufactured and marketed by [plaintiff] for general use * * *." Thus, the effect was to obligate Brown not to market in the United States headsets or parts of the types produced or sold by plaintiff. Since this obligation applied not only to patented but also to unpatented headsets, it purported to extend plaintiff's protection beyond the scope of its patents, at least insofar as concerned any threat of competition from the importation of headsets made abroad by Brown.

[3] However, whether this clearly anti-competitive provision constitutes misuse of any of the three U.S. patents in suit, under which Brown was not licensed, is another question. Fortunately, it is a question we need not decide, for the effects of any such misuse have clearly been dissipated.

The last agreement between plaintiff and Brown was terminated on August 30, 1972, shortly after the present action was filed. Moreover, even while the agreement was in force it apparently had no actual effect on the market, since it is undisputed that Brown's efforts to produce a marketable headset were unsuccessful, and it was unable to sell, even in Britain where it had an exclusive license, enough headsets to earn or pay the $2,000 annual minimum royalty.

Under these circumstances, any misuse of the patents in suit which might have existed has been purged and its market effects, if any, long since fully dissipated. The defense of unenforceability based thereon is thus no longer viable. See Kins, Dissipation of Patent Misuse, 1968 Wisconsin Law Review 918.

The motion to strike is granted.

Appendix B

and Distributor's motion to dismiss Counts III, IV and V for lack of subject matter jurisdiction is granted.

In writing this opinion, I am aware that "there is substantial ground for difference of opinion" on two legal grounds: (1) whether venue in this court is proper under 15 U.S.C. § 22, and (2) whether Importer or Distributor is an "automobile manufacturer" as defined in 15 U.S.C. § 1221(a). I believe that the final resolution of these questions will "materially advance the ultimate termination of this litigation." I, therefore, advise the attorneys that this order is appealable within ten days under 28 U.S.C. § 1292(b).

The Clerk will schedule a pretrial conference within thirty days for setting up a discovery schedule and trial assignment.

So ordered.

PLANTRONICS, INC., Plaintiff,
v.
ROANWELL CORPORATION, Defendant.
No. 72 Civ. 1625 (WCC).

United States District Court,
S. D. New York.
Aug. 28, 1975.

Patentee brought action for infringement of two utility patents and a design patent relating to lightweight headsets. The District Court, Conner, J., held that claim 1 of patent No. 3,184,556 was valid and infringed; that patent No. 3,548,118 was invalid as obvious in light of prior art; and that design patent No. Des. 218,173 was invalid for obviousness.

Judgment accordingly.

1. Patents ⇐328(2)
Claim 1 of patent No. 3,184,556, relating to lightweight headsets, was valid and infringed.

2. Patents ⇐112.2
There is prima facie presumption that claimed invention was conceived by named patentee, presumption which is rebuttable only by evidence which is clear, strong and convincing.

3. Patents ⇐328(2)
Patent No. 3,548,118, relating to lightweight headsets, was invalid as obvious in light of prior art, but was not invalid for fraud on patent office or for double patenting. 35 U.S.C.A. § 103.

4. Patents ⇐17(1)
It does not negate patentable invention merely to establish that desirable goal, once perceived, could have been reached by exercise of routine skill, but patentable ingenuity may be involved in perception of goal. 35 U.S.C.A. § 103.

5. Patents ⇐1
Manufacturer could not be prevented from copying design of competitive product on market in absence of valid patent covering it or of confusion as to source of goods.

6. Patents ⇐18, 36.2(1)
Commercial success, while indeed makeweight for patentability, cannot tip balance against heavy evidence of obviousness. 35 U.S.C.A. § 103.

7. Patents ⇐97
In absence of either intent to deceive or recklessness, patent is not invalid for fraud.

8. Patents ⇐328(1)
Design patent No. Des. 218,173, relating to lightweight headsets, was invalid as obvious. 35 U.S.C.A. § 103.

9. Patents ⇐97
Evidence established that patent applicant's failure to call attention of patent office examiner to certain prior art was apparently without any deceptive intent and did not constitute fraud on patent office.

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10. Patents ⇐325.11(5)

Where none of patentee's claims of infringement and none of the defenses thereto were sham or frivolous, but were clearly asserted in good faith and with obvious conviction, trial was conducted expeditiously and with great skill on both sides, and counsel were not only courteous, but admirably cooperative in discovery and in entering into stipulation of fact which materially shortened trial, no attorney's fees would be awarded. 35 U.S.C.A. § 285.

Tom Arnold, Paul M. Janicke, and Arnold, White & Durkee, Houston, Tex., Brumbaugh, Graves, Donohue & Raymond, New York City, for plaintiff; Robert Neuner, New York City, of counsel.

Cooper, Dunham, Clark, Griffin & Moran, New York City, for defendant; Lester W. Clark, Charles W. Bradley, New York City, of counsel.

OPINION

CONNER, District Judge:

This is an action for infringement of two utility patents and a design patent owned by plaintiff Plantronics, Inc. (Plantronics), relating to lightweight headsets (microphone and earphone assemblies) as used, for example, by airplane pilots and air traffic controllers. The action was tried without a jury, and this opinion comprises the Court's findings of fact and conclusions of law pursuant to Rule 52(a) F.R.Civ.P.

The Parties

Plantronics, formerly known as Pacific Plantronics, Inc., is a corporation of the State of California having its headquarters in Santa Clara, California. It is the successor of a partnership doing business as Plane Aids Company (Plane Aids). Its principal business is the manufacture and sale of headsets.

Defendant Roanwell Corporation is a corporation of the State of New York having its principal place of business in New York City. It is also in the business of manufacturing and selling headsets.

Jurisdiction and venue are not challenged.

Plaintiff is the owner of the three patents in suit, identified below.

I. THE LARKIN PATENT

[1] The Larkin U.S. patent 3,184,556, issued May 18, 1965 on an application filed December 11, 1961, concerns a headset which utilizes a miniature microphone and a miniature receiver mounted within a small capsule which is supported near the wearer's ear, with a self-supporting, bendable, small-diameter, acoustic tube extending from the microphone to a point adjacent the wearer's mouth, and a flexible, small-diameter acoustic tube extending from the receiver and having at its outer end a plug inserted in the wearer's ear canal. In the illustrative headset disclosed in the patent, the capsule is provided with a spring clip which is adapted to be clipped onto the temple bar of a pair of eyeglasses or onto a headband. A small-diameter multi-conductor cable connects the microphone and receiver to external communications equipment. Only Claim 1 of the patent is in suit. It is set forth in full in the margin.[1] It is charged to be infringed by two of the Roanwell headsets, models R–70 and R–71.

Roanwell originally admitted the infringement of Claim 1 by both of these models, but shortly before trial withdrew that admission and now contests the charge of infringement against both.

1. Claim 1 of the Larkin patent reads:
"1. A miniaturized microphone headset employing a miniature microphone and a miniature receiver, comprising the combination of support means for detachably supporting the miniature microphone and the miniature receiver adjacent to the wearer's ear, a first acoustical tube, means for attaching one end of said first tube to said microphone and the other end of said first tube being adapted to be positioned adjacent to the wearer's mouth, a second acoustical tube, and means for attaching one end of said second tube to said receiver and the other end of said second tube being adapted to be plugged into the wearer's ear."

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In addition to denying infringement, Roanwell asserts the following affirmative defenses against the Larkin patent: anticipation by and obviousness in view of the prior art, lack of inventorship, fraud on the Patent Office and indefiniteness of the asserted Claim 1.

A. ANTICIPATION AND OBVIOUSNESS

In this, as in most patent infringement actions, the pivotal issue is whether the invention would have been obvious at the time it was made to a person having ordinary skill in the art, 35 U.S.C. § 103, a standard which Judge Learned Hand justifiably termed "perhaps the most baffling concept in the whole catalogue of judicial efforts to provide postulates for indefinitely varying occasions." Lyon v. Bausch & Lomb Optical Co., 224 F.2d 530, 536 (2d Cir. 1955).

Viewed retrospectively, the Larkin invention would seem an obvious combination of old elements. But so would virtually every other invention which consists of a combination of mechanical and/or electrical components. Thus we have been admonished by *Graham v. John Deere Co.*, 383 U.S. 1, 36, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966), to avoid "'slipping into use of hindsight'" and to "resist the temptation to read into the prior art the teachings of the invention in issue" by determining the issue of obviousness under § 103 in accordance with the following uniform procedure:

> "Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy." *Id.* at 17–18, 86 S.Ct. at 694.

The "secondary considerations" referred to were apparently inspired by the repeated statements of Judge Learned Hand, for example in his oft-quoted opinion in *Reiner v. I. Leon Co.*, 285 F.2d 501, 503–04 (2d Cir. 1960), *cert. denied*, 366 U.S. 929, 81 S.Ct. 1649, 6 L.Ed.2d 388, *reh. denied*, 366 U.S. 978, 81 S.Ct. 1918, 6 L.Ed.2d 1268 (1961):

> "The test laid down is indeed misty enough. It directs us to surmise what was the range of ingenuity of a person 'having ordinary skill' in an 'art' with which we are totally unfamiliar; and we do not see how such a standard can be applied at all except by recourse to the earlier work in the art, and to the general history of the means available at the time. To judge on our own that this or that new assemblage of old factors was, or was not, 'obvious' is to substitute our ignorance for the acquaintance with the subject of those who were familiar with it. There are indeed some sign posts: e. g. how long did the need exist; how many tried to find the way; how long did the surrounding and accessory arts disclose the means; how immediately was the invention recognized as an answer by those who used the new variant?"

See also *Safety Car Heating & Lighting Co. v. General Electric Co.*, 155 F.2d 937, 939 (2d Cir. 1946), and cases cited therein.

In most validity contests, it is these "signposts" which furnish the only objective guidance and which ultimately prove dispositive. However, we must begin with the preliminary determinations directed by *Graham*.

Scope and content of the prior art

The principal prior patents and publications relied on by Roanwell in attack-

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ing the validity of Larkin are the following:

British Pritchett patent 191 (1878)

This patent, issued at the dawn of the age of telephony, shows several different types of microphone and receiver combinations designed to leave the hands free for writing and other functions, the version most relevant here being that of Figure 5. That device includes a single transducer for both transmitting and receiving, contained in a rather large and cumbersome horn-shaped housing resembling an inverted receiver from an old pedestal-type telephone which is adapted to be suspended from a clip on the wearer's lapel. A rigid tubular column projects from the large upper end of the housing to a point opposite the wearer's ear and a rigid horizontal tubular extension at its upper end projects into the ear canal. A smaller diameter voice tube projects forwardly and upwardly from the housing, and a small horn at its outer end is positioned in front of the wearer's mouth.

There is no evidence that this device, implausibly designed by an architect, was ever constructed, much less marketed, and there is considerable doubt as to its practicability. Movements of the wearer's head, if they were permitted at all by the spike-like column impaling the wearer's ear, would vary the distance from the mouth to the voice tube and accordingly the amplitude of the transmitted signal.

Olney et al. U.S. patent 2,485,405 (1949)

Olney, which was cited and considered by the Patent Office during prosecution of the Larkin application, shows a headset consisting of a single "platform" type earpiece which lies flat on the auricle or external ear and is supported by a resilient metal headband extending over the top of the wearer's head, and which contains both the receiver and the microphone, with a dual acoustic tube cantilevered from the earpiece and extending to a point adjacent the wearer's mouth. The two voice tubes are respectively connected to opposite sides of a dual-chambered input housing, and to opposite sides of the microphone diaphragm, so that "noise" or extraneous sound waves from remote sources which are substantially equidistant from the inlet orifices at opposite ends of the input housing impose substantially equal and opposite pressures on the diaphragm and are thus effectively cancelled out. This noise-cancelling dual voice tube arrangement is described as optional and replaceable by a single voice tube.

As far as the record shows, the Olney device was never commercialized.

The Western Electric WE 52 headset

The WE 52, which was standard equipment for telephone operators in the Bell System during the 1950's, is similar in configuration to the Olney headset, having a single platform earpiece supported by a headband, with a microphone supported in front of the wearer's mouth by a boom cantilevered from the earpiece.

In practice, this headset proved uncomfortable when worn for long periods and also unstable, as rapid head movements tended to cause the platform earpiece to slide on the ear, with resulting displacement of the microphone relative to the mouth.

Dreher et al. U.S. patent 2,904,640 (1959)

Dreher, also a file wrapper reference against Larkin, discloses a headset having a molded plastic body shaped to fit into the concha of the ear with an integral, tubular extension projecting into the ear canal. The body supports a single transducer used for both transmitting and receiving under control of a remote push-to-talk switch. A rigid, bendable voice tube cantilevered from the body has at its outer end an intake cup positioned in front of the wearer's mouth.

This device, which was not widely used, if it was marketed at all, has the disadvantage that the earmold insert must be shaped and sized to fit the individual wearer and must always be worn on the same side of the head. The stability of the headset is also highly questionable.

The Telex headset (1959)

This headset incorporates the widely uesd Telex "Twinset," a receive-only headset shown in the Gilbert U.S. patent 2,586,644 issued in 1959, which had a resilient metal headband with a small plastic housing at each end adapted to lie against the side of the head adjacent one of the ears and containing a small receiver. A rigid, curved ear tube was rotatably mounted on each housing to permit adjustment of the portion of its outer end, which was provided with a plug to fit into the ear canal. A Telex flyer published in 1959 shows a modification of this device having a microphone boom cantilevered from one of the housings with a microphone at its outer end adjacent the mouth. The mass of the microphone at the outer end of the boom, with its substantial moment arm, created a problem of stability.

The Spencer-Roberton article (1960)

This article in a technical publication shows the headset which at that time was standard equipment for telephone operators in Great Britain. Like the Olney headset, it includes a single headband-supported platform earpiece containing a microphone witth a cantilevered, bendable, segmented input horn, mounted for rotation about the axis of its small end to permit proper positioning of its enlarged input end in front of the wearer's mouth.

Henderson U.S. patent 2,939,923 (1960)

Henderson discloses hearing aid earpieces of several configurations, the most relevant probably being that of Figures 4 and 5, which has a small cylindrical housing containing a receiver which is supported from a flexible acoustic tube which extends over the top of the ear and terminates in a plug adapted to fit into the ear canal, the tube extending through an optional molded insert shaped to fit the concha of the ear for enhanced stability. A lightweight cord connects the earpiece to an external housing containing an amplifier and a microphone which, for example, may be carried in the pocket of the wearer's shirt or jacket.

Guttner et al. U.S. patent 3,209,080 (filed 1961)

Guttner discloses a self-contained hearing aid of the "post-auricular" type having a curved housing adapted to fit behind the external ear, with a hook-like extension at one end adapted to engage the upper front edge of the auricle. The housing contains a microphone, amplifier and receiver, with the latter communicating with a flexible acoustic tube which extends from the end of the hook-like extension and terminates in a plug fitting into the ear canal. Incoming sound waves reach the microphone through a short passageway of small diameter which opens at the front side of the hook-like extension.

The differences between the claimed invention and the prior art

All of the individual elements of the combination recited in Claim 1 are shown by the prior art. However, no single item of prior art shows the complete combination.

Roanwell contends that Pritchett (Figure 5) and Dreher each fully anticipates Claim 1. Neither does so.

In Pritchett, there is not a "*miniature* microphone *and* a *miniature*" receiver as called for in Claim 1, but a single large and ungainly transducer. Nor is there "support means for detachably supporting the miniature microphone and miniature receiver adjacent to the wearer's ear," as further called for. In Figure 5 of Pritchett, the transducer housing is suspended against the wearer's chest.

Dreher likewise has only a single miniature transducer for both transmission and reception. Dreher further lacks "support means for detachably supporting the miniature microphone and the miniature receiver *adjacent to* the wearer's ear," and "a second acoustical tube, and means for attaching one end of said second tube to said receiver and the other end of said second tube being adapted to be plugged into the wearer's ear," in the sense intended by Claim 1. In Dreher, the earmold housing supports the trans-

ducer not *adjacent to* the auricle, but *in* it. Moreover, to read Claim 1 on Dreher would require a multiple inclusion: the one-piece earmold insert would have to be, at one and the same time, 1) the "support means," 2) the "second acoustical tube," and 3) the "means for attaching one end of said second tube to said receiver." Finally, the portion of the claim that reads "the *other end* of said second tube being adapted to be plugged into the wearer's ear" suggests that the ear receives only the end of a tube which extends for some distance outside; in Dreher, the *entire* tubular extension projects into the ear canal.

However, I do not agree with Plantronics' further argument that Dreher's tubular extension is too short to be an "acoustical tube" because that expression is applicable only to tubes of sufficient length (e.g., 1½ inches) to exhibit resonance peaks and nulls in the audio frequency range. I find no basis, in the specification or elsewhere, for reading any such limitation into Claim 1, and I therefore interpret the term "acoustical tube" as encompassing any tube which carries sound waves.

Nevertheless, I conclude that Claim 1 is not anticipated by any single item of prior art.

With the always perfect guidance of hindsight, it is easy now to see how the claimed combination could be assembled by properly selecting individual elements or even groups of elements from the various prior art devices. For example, Guttner disclosed a housing containing a miniature microphone and miniature receiver, with the latter communicating with a flexible acoustic tube terminating in an ear plug. Olney taught an acoustic tube extending from a point near the wearer's mouth to a microphone in the same housing that contains the receiver. Adding Olney's voice tube to Guttner's device, and modifying Guttner's electrical circuit, as also taught by Olney, so that the microphone and the receiver, instead of being connected to one another through an amplifier, are connected to separate external transmitting and receiving circuits, would produce the complete combination recited in Claim 1 of Larkin.

This assumes, of course, that the claim is interpreted, as Plantronics contends it should be (and as it must be for it to be infringed by the accused Roanwell headsets), so that the "support means" covers a post-auricular housing hooking over the ear and not merely the eyeglass clip-on capsule illustratively shown.

However, no such combination of the elements of Guttner and Olney was suggested by either. Since there are rarely any new elements, virtually any combination of elements ever claimed could be thus pieced together by properly selecting individual elements from the infinite parts bin of the prior art. As Judge Learned Hand repeatedly observed, for example, in *Safety Car Heating & Lighting Co. v. General Electric Co., supra* at 939:

> "Substantially all inventions are for the combination of old elements; what counts is the selection, out of all their possible permutations, of that new combination which will be serviceable. No objective standard is practicable; (*Kirsch Manufacturing Co. v. Gould-Mersereau Co.*, 2 Cir., 6 F.2d 793; *Potts v. Coe*, 78 U.S.App.D.C. 297, 140 F.2d 470; as, for example, whether each of the elements operates in a different way from what it did in other combinations. That is almost never true of a machine; each member ordinarily performs the same mechanical function which it does in any other machine; it is their cooperation that produces the result, and the value of that cooperation depends upon the sagacity which divined the end and fabricated the means."

See also *B. G. Corp. v. Walter Kidde & Co.*, 79 F.2d 20 (2d Cir. 1935); *Kirsch Mfg. Co. v. Gould Mersereau Co.*, 6 F.2d 793, 794 (2d Cir. 1925). Judge Medina made a more recent statement to the same effect in *Ling-Temco-Vought, Inc.*

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v. Kollsman Instrument Corp., 372 F.2d 263, 268 (2d Cir. 1967).

Thus, as virtually always, we must ultimately resort to a review of the history of the art before and after the invention. Incidentally, such a review, in combination with the prescribed prefatory analysis of the prior patents and publications, is also usually the best, and frequently the only, way to determine "the level of ordinary skill in the art" as further directed by *Graham*.

The history of the art

The Air Force Panel

In 1956, the United States Air Force found all the headsets then available so unsatisfactory that it initiated a survey which involved convening a Panel of Experts to canvass all the possible alternatives.

The 1959 report of that Air Force project reads in part:

> "Objective of the Program
>
> "The basic purpose of the program was to discover and explore improved means for voice communication during Air Force operations. * * * Improvements are desired which will:
>
> "(a) decrease the size, weight and discomfort associated with the equipment which must be worn on or about the head of the flier; * * *
>
> "The discomfort of flying headgear is to a large degree attributable to the interphone equipment. * * * The degree of discomfort which we are concerned with here is in the category of *intolerable*. Specifically, the complaint has been called *ear torture*. It is reported as being of such degree as to detract from the operational effectiveness of flying personnel on long range bombing missions. If a man is supposed to wear his helmet for the duration of a flight, but cannot because of intolerable pain, and without it he is not only inadequately protected, but cannot be adequately supplied with oxygen, and is inadequately prepared for emergency flight conditions, then the condition is an operational hazard. Hence, elimination of discomfort has been an *urgent necessity*." (Emphasis added)
>
> * * * * * * *
>
> "The first step in the program was to assemble a team, including some of the most competent experts in the field from all over the country. The program has been guided by a Panel of Experts consisting of ten individuals or groups having great experience in all aspects of the problem: electro-acoustic transducer design * * *."

This Panel of Experts prepared a list of all the known types of transducers, means for coupling them to the audio source and to the ear, and means for excluding unwanted signals or "noise." It recommended for further investigation several types of microphones and coupling systems, none of which was used in the Larkin headset. It produced no solution to the recognized problem of "ear torture."

United Air Lines

In 1960, United Air Lines was using a headset designated HS–33, which was a receive-only unit of the "circumaural" type, with each of the two receivers supported at the center of an "earmuff" or padded ring surrounding one of the external ears, so that the pressure was applied against the adjacent portions of the head rather than the ear itself, and with the two muffs connected by a resilient metal band extending over the top of the head. A separate hand-held microphone was used for transmission. In a memo of June 30, 1960, United's Engineering Vice President, Mentzer, described the HS–33 headset model as "large, cumbersome, and uncomfortable to wear," and the hand-held microphone as "relatively large, heavy, elusive and awkward."

United had experimented with Western Electric's WE 52 headset, which weighed about half a pound, and consisted of a single "platform" type earpiece which contained the receiver and which was supported by a resilient metal headband. The microphone was supported in front of the wearer's mouth, on an adjustable

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metal boom cantilevered from the earpiece.

United found both the WE 52 headset, and a similar Telex headset, which it also tested, unstable; if the wearer moved his head quickly, they would tend to slide out of position or even fall off.

The Mentzer memo of June 1960 included a photograph of a typical eyeglasses-contained hearing aid of the type then commercially available, having the amplifier housed in an enlarged temple bar and a flexible acoustic tube plugged into the wearer's ear canal.

The Mentzer memo suggested a similar approach to the problem of a lightweight headset, and included another photo of a mockup in which conventional eyeglass frames were used to support a round button-type hearing aid receiver in the concha of the ear, with a tubular extension projecting into the ear canal, and with a microphone suspended in front of the mouth by wires connected to opposite sides of the eyeglass frames. This suggestion was never developed beyond this inoperative mockup. Believing it to be "too far off for our urgent need," Mentzer's superior, J. M. Hodgson, in August 1960 ordered United's San Francisco engineering group to "review the market to determine what is available in the headphone/boom mike field," and to procure samples for evaluation. This task was assigned to two United engineers: Austin F. Trumbull, who was Superintendent of Electronic Engineering, and one of his engineers, Merlin Leonhardt.

Leonhardt proceeded to contact some 20 to 25 U.S. and foreign vendors in the headset field, including Roanwell, requesting information on available lightweight headsets, with transistorized amplifiers and dynamic microphones. Nineteen companies replied. Twelve of the nineteen said they could not meet United's requirements; the remaining seven, including Roanwell, sent brochures or submitted sample units. None was found satisfactory by United.

One of the samples submitted was from Airmed, Ltd., of Great Britain. The Airmed unit weighed about a pound, had two circumaural muffs connected by a metal headband, and a boom microphone mounted in front of the mouth. United evaluated this headset as a good boom-microphone headset for the state of the art at that time, but still too clumsy, and unacceptable for United's needs.

A brochure submitted by Amplivox showed a headset called "Amplilite," which was similar to the Airmed. Because of this similarity, a sample was not requested. It was judged also unsatisfactory because of its clumsiness—even though it was being promoted by its manufacturer as combining lightweight wearing comfort with a robust construction.

Carter Engineering submitted a headset sample, also employing two ear muffs, headband and boom mike suspended in front of the mouth. United found this unit to be "very cheaply constructed" and "quite uncomfortable after one hour of wearing," and similarly rejected it.

Roanwell submitted a brochure, but it did not disclose any new lightweight assemblies. Telephonics promised to submit a sample, but never did.

Telex submitted a prototype which was a modification of its Twinset with a boom microphone mounted in front of the mouth, similar to the combination shown in the aforementioned Telex flyer.

United evaluated the Telex unit, and found that, although it was relatively light (a quarter to a half pound), it was still "not what we were looking for." The substantial mass of the microphone, cantilevered in front of the mouth, some distance from the point of support, caused it to be unstable; its movement away from the mouth reduced the output of the transmissions.

United thus found no suitable lightweight headset through this search.

During 1960–61, Plane Aids sold under the name "Sun & Fun" a transistor radio mounted in an enlarged temple bar of a pair of sunglasses, with a flexible acoustic ear tube extending from the temple bar and having at its outer end a plug fitting into the wearer's ear canal. Upon seeing a promotional flyer for this unit, Trumbull of United, over the signature of Mentzer, wrote to Plane Aids, advising that United was interested in some of the techniques involved in the radio sunglasses, but for a different application. After an initial meeting between the patentee, W. Keith Larkin, then president of Plane Aids, and Trumbull and Leonhardt of United, in which Trumbull explained United's needs, Plane Aids commenced a project for development of a headset to satisfy those needs.

This project resulted in the Plantronics headset, identified as MS–50, a commercial adaptation of the headset described and claimed in the Larkin patent in suit, which was tested by United and adopted as standard for all of its aircraft. This unit, which has previously been described, weighed about one ounce, was comfortable and compact, could be worn on either side of the head, had good audio characteristics, and permitted intra-cockpit conversations.

Pan American and a number of other airlines subsequently followed United's lead and likewise standardized on the MS–50.

Federal Aviation Administration (FAA)

An official FAA report entitled "Development of Lightweight Headset," dated February 1963, described the long-existing need for such a satisfactory headset as follows:

> "For many years the Agency has sought an improved headset which could be worn by controllers for long periods of time without discomfort and yet provide adequate transmission and reception capabilities. The headsets normally issued have been described by the controllers as bulky, heavy, uncomfortable, and cumbersome. They have been known to produce headaches and sore ears after continuous wear, and have caused interference with normal activities such as eating and smoking."

In attempting to overcome these problems, the FAA had organized an in-house development effort, described in the report as follows:

> "Numerous attempts have been made to provide improved headsets both by requests to the telephone companies and by investigation of commercially available items for possible use by air traffic controllers.
>
> "Several commercially available items have appeared promising and have been privately purchased and tried with some favor. Foremost of these were the Telex headsets and various hearing aid receivers which employed earpieces to fit inside the ear, thereby eliminating the earcups and pads which were a major cause of discomfort. Minor modifications were made to the currently used Western Electric Type 52 headset from time to time, but there were no major improvements.
>
> "A number of the most promising commercially available items were purchased and sent to the National Aviation Facilities Experimental Center for tests of their acoustical characteristics. The plan was to determine the most suitable transducer elements for transmitting and receiving and to develop an improved headset using these elements as a basis."

This search ended when the FAA saw the Plantronics MS–50. As stated in the official report:

> "In September, 1961, representatives from Plantronics, Incorporated, came in with an idea and a proposal. The headset which they proposed to develop appeared so ideally suited for air traffic control use that the previously planned in-house development effort was discontinued."

A comparative evaluation of the best available headsets was conducted by the FAA, involving forty air traffic controllers with "a cross-selection of dif-

ferent usage, head shapes and sizes, ages, and environment." The test was among the Plantronics MS–50, a new headset supplied by Bell Telephone Laboratories, called the Y–1, and the then-standard WE 52. The Y–1 was essentially a lighter version of the WE 52, in which the WE 52's front-mounted boom microphone was replaced by an exponential horn extending from a microphone mounted on an earphone of the same configuration as that used in the WE 52. The Y–1 was thus similar to the standard British telephone headset, as disclosed in the Spencer-Roberton 1960 article.

After several weeks' use of each of the headsets, 77% of the controllers expressed a preference for the MS–50, with 89% rating it the most comfortable. Additionally, and somewhat surprisingly in view of the miniature transducer used in the MS–50, the controllers found the MS–50 to be more satisfactory in the respect of audio characteristics than either the Y–1 or the WE 52. The FAA accordingly standardized on the MS–50 for air controller use.

National Aeronautics and Space Administration (NASA)

According to Mr. George Metcalfe, a NASA Communications Specialist responsible for the issuance and maintenance of headsets at Cape Canaveral and later at the Manned Spacecraft Center in Houston, in the use of all the headsets known and available in 1961, including the WE 52 then standard for NASA ground controllers, "[t]he fatigue problem was a major complaint."

After becoming aware of the Plantronics MS–50, despite initial opposition to it by Metcalfe, virtually all the NASA ground controllers adopted it. Metcalfe also was ultimately won over, referring to the MS–50 as

> "an excellent headset. * * * * [L]ightweight. You can wear it for eight hours without caving in. And it has been a fantastic improvement over the WECO 52 headset."

The MS–50 was accordingly adopted as standard equipment at NASA.

Market impact

The Plantronics MS–50 has enjoyed substantial commercial success. Over 700,000 units have been sold. Even after the introduction of Plantronics' later model "StarSet" (a post-auricular headset which is the subject of the Hutchings utility patent, and is also claimed to come within Claim 1 of the Larkin patent), many users continued to buy the eyeglass-mounted MS–50 in preference to it.

The MS–50 was the first headset designed by an outside manufacturer to be approved for use in the Bell Telephone system. This experience caused Bell, which had long opposed the use of miniature transducers, to accept and even favor them.

Other headset manufacturers also became converts. Amplivox, which had submitted an unacceptably heavy headset to United Aircraft, produced a new headset called the "Minilite" which was similar to Larkin's. Electro-Voice later submitted to United Aircraft a similar model.

Roanwell

In 1962, Roanwell obtained and evaluated an early commercial unit of the MS–50 headset. Its reaction was favorable to the point of envy. Roanwell's engineers stated:

> "It seems that Plantronics has come up with a combination of user comfort, low weight, high versatility, and adequate voice transmission which has gained them appreciable acceptance (Project Mercury) in a relatively short time."

And Roanwell's management expressed agreement with their engineers' conclusion that the Plantronics headset, "may be the basis of a new generation of headsets." It accordingly authorized a project to produce a similar headset. As one of their engineers on the project, Mr. Foley stated:

> "It was essentially a copy of the MS–50 from Plantronics, one of their models with some slight changes to make it look slightly different."

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This Roanwell project continued for a year or more; tooling was acquired and a parts inventory purchased. For reasons unexplained by Roanwell, the project was abruptly terminated around December 1965, before commercial production had begun.

The reason apparently lay in the fact that the Larkin patent had issued in May of 1965. Six weeks later, in July 1965, an attorney for Plantronics wrote to Roanwell indicating that Plantronics had been informed that Roanwell was designing a copy of the Plantronics headset on the assumption that it was not protected by a patent, and supplying a copy of the issued Larkin patent with an admonition that any infringement of it would result in appropriate legal action.

SUMMARY

All of the "signposts" thus appear to point in the direction of non-obviousness.

The record establishes that there was a long-recognized need for a lighter, more comfortable headset to eliminate the fatigue and pain, rather extravagantly termed "ear torture," involved in the wearing of all previously known headsets over extended periods. A number of organizations with access to the best minds in the field, including the airlines, the U.S. Air Force and FAA, as well as the industry suppliers whom they consulted, had been actively searching over a number of years for an answer to the problem, but had found none, despite the availability of all the components ultimately employed by Larkin. When Larkin's headset was publicly disclosed, it received almost immediate recognition as an elegant and ingenious solution. It enjoyed impressive commercial success. It revolutionized thinking in the headset industry, overcoming ingrained prejudices, and its concepts have been widely copied by competitors, one of whom aptly termed it the progenitor of a "new generation of headsets."

These same factors have been characterized by Judge Learned Hand as the strongest possible proof of patentable invention. In *Lyon v. Bausch & Lomb Optical Co.*, 224 F.2d 530, 535 (2d Cir. 1955), he stated:

> "The most competent workers in the field had for at least ten years been seeking a hardy, tenacious coating to prevent reflection; there had been a number of attempts, none satisfactory; meanwhile nothing in the implementary arts had been lacking to put the advance into operation; when it appeared, it supplanted the existing practice and occupied substantially the whole field. We do not see how any combination of evidence could more completely demonstrate that, simple as it was, the change had not been "obvious * * * to a person having ordinary skill in the art"—§ 103.

Indeed, as simple as the invention now appears, it would seem presumptuous to the point of arrogance to conclude that it was "obvious" to persons of ordinary skill in the art, notwithstanding their lengthy and unsuccessful struggle to achieve such results. As I recently wrote for the Court of Appeals in *Timely Products Corp. v. Stanley Arron*, 523 F.2d 288 (2d Cir. 1975):

> "We can conceive of no better way to determine whether an invention would have been obvious to persons of ordinary skill in the art at the time than to see what such persons actually did or failed to do when they were confronted with the problem in the course of their work. If the evidence shows that a number of skilled technicians actually attempted, over a substantial period, to solve the specific problem which the invention overcame and failed to do so, notwithstanding the availability of all the necessary materials, it is difficult to see how a court could conclude that the invention was obvious to such persons at the time."

I accordingly conclude that the invention defined by Claim 1 of the Lark-

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in patent is not invalid on the ground of obviousness under 35 U.S.C. § 103.

B. INVENTORSHIP

Roanwell contends that the Larkin patent is invalid on the further ground that the claimed invention was conceived not by Larkin but by William Bowman, an electronics technician who was employed by Plane-Aids in 1961, shortly before the first prototype was submitted to United Airlines.

This contention is based entirely upon Bowman's uncorroborated deposition testimony that at the time he was hired by Plane-Aids, Larkin had been working on a balsa wood mockup shaped like Plane-Aids' "Sun & Fun" radio sunglasses with a boom microphone added, and that, upon being asked to evaluate it, he told Larkin that it offered nothing new and that he would like to explore some ideas of his own. Thereafter, according to Bowman, he tested a voice tube extending from a miniature microphone mounted on the temple bar, in place of the boom microphone, and when he showed it to Larkin and to Graham, a United Airlines pilot who was Plane-Aids' chief executive officer, they were surprised that it worked; and the balsa wood mockup was accordingly abandoned in favor of a pair of Dahlberg hearing aid eyeglasses having attached to the large temple bar a microphone with a voice tube extending from it.

This testimony was flatly contradicted by Larkin, who said that he suggested the voice tube to Bowman who was initially dubious of its operability because such tubes were known to exaggerate bass tones. Larkin says that, although his knowledge of acoustical tubes was "zero," he envisioned that this bass accentuation might tend to "offset the tinniness we were encountering" in the audio output of the miniature microphone, an assumption which was later proved correct.

Larkin's testimony was corroborated by a notarized invention disclosure document which he prepared and executed on July 7, 1961, and by the deposition testimony of a Mr. Burnell, who was one of the three or four full-time employees the company then had, and who is now unconnected with Plantronics and is thus a disinterested witness.

[2] There is a *prima facie* presumption that the claimed invention was conceived by the named patentee, a presumption which has been said to be rebuttable only by evidence which is "clear, strong and convincing." *Cummings v. Moore*, 202 F.2d 145, 148 (10th Cir. 1953). Plantronics argues that *Coffin v. Ogden*, 85 U.S. (18 Wall.) 120, 21 L. Ed. 821, 823 (1874), would require proof "beyond a reasonable doubt," but I need not decide whether that standard is applicable here, since Roanwell has failed to establish Bowman's alleged origination of the invention by even a simple preponderance of the evidence.

Roanwell also argues that it was Bowman who suggested mounting the microphone and receiver in a capsule which clips onto the frame of the eyeglasses. Roanwell has failed to establish even this much, but it would be of no consequence if it had, because Claim 1, the only claim of Larkin in suit, does not recite the clip-on capsule.

C. FRAUD ON THE PATENT OFFICE

Roanwell further contends that the Larkin patent is invalid on the ground of fraud in the prosecution of application for the Larkin patent, in that the original claims covered a miniature headset with an acoustical voice tube, without mentioning the ear tube and, after the claims were rejected on the basis of the Dreher patent disclosed above, they were amended by adding the recitation of a second acoustical tube extending into the ear, with the "Remarks" accompanying the amendment asserting that Dreher "only has one tube." Roanwell argues that Larkin and his attorneys not only knew that Dreher also had an ear tube, but they also knew of many other devices that had ear tubes, including Plane-

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Aids' own "Sun & Fun" radio sunglasses and the Dahlberg hearing aid eyeglasses, both of which Larkin had used in constructing early prototypes of his headset.

Insofar as Dreher's disclosure is concerned, the Patent Office examiner had the patent itself before him, and knew just as well as Larkin what it disclosed. In arguing that Dreher has only one tube, Larkin's attorneys clearly meant only that Dreher did not have an ear tube in the sense intended by Claim 1.

When the language of Claim 1 is interpreted in the context of the complete claim and in the light of the specification, as it must be, the "second acoustical tube" is seen to refer to a flexible tube which extends from a receiver on a support means located adjacent to (but not *in*) the external ear and which has at its outer end a plug fitting into the ear canal. In arguing that Dreher has only one tube, Larkin's attorney obviously meant that Dreher has no ear tube *of this type*. He surely did not mean, as Roanwell implies, that Dreher has no ear tube *at all*, because the examiner was obviously aware that Dreher's ear-mold insert has an integral tubular extension which projects into the ear canal.

Nor was there any apparent deceptive design in Larkin's failure to disclose to the Patent Office the use, in prior devices, of flexible ear tubes plugging into the ear canal. The same examining division which handled the Larkin application was also responsible for examining applications on hearing aids. And it was a matter of common knowledge in the art that post-auricular hearing aids had been provided with such ear tubes. Larkin was surely not trying to conceal such a well-known fact. Nor was there any reason for him to do so. He was not claiming any novelty in ear tubes *per se*, but only in the complete combination which included a support means adjacent the ear supporting a miniature microphone and a miniature receiver with voice and ear tubes extending respectively from them.

Roanwell has thus failed to establish any material misrepresentation or concealment by Larkin, much less the required intent to deceive or reckless disregard of the duty of candor. *Xerox Corp. v. Dennison Mfg. Co.*, 322 F.Supp. 963, 969 (S.D.N.Y.1971).

D. INFRINGEMENT

After initially conceding that both its R–70 and R–71 headsets infringe Claim 1 if it is valid, Roanwell now contends that the portion of the claim that calls for "support means for detachably supporting the miniature microphone and the miniature receiver adjacent to the wearer's ear" is not applicable to the post-auricular housing hooking over the auricle which is employed in both the R–70 and the R–71.

Roanwell argues that in their headsets, the microphone and receiver are not supported "*adjacent to* the wearer's ear" but *on* it. The short answer is that *both* conditions are met—the transducers are supported *adjacent* to the ear, in the sense of proximity, and are supported *on* the ear in the sense that their weight is carried by the ear. Thus I encounter no difficulty in concluding that the language of Claim 1 is literally readable in its entirety, on both the R–70 and R–71.

However, that is not the end of the matter. The last sentence of 35 U.S.C. § 112 provides that

> "An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof."

The question thus remains whether the ear-hook arrangement of the Roanwell headsets is an "equivalent" of the eyeglass-clip supporting means disclosed in the Larkin patent. I find that it is. In both structures, the housing is supported on the side of the head adjacent to (but not in) the ear, with its weight

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supported, at least in part, on the top of the ear, eliminating the clamp-type headbands and the inward pressure they imposed either on the ears themselves or on the sides of the head adjacent the ears, which had characterized virtually all the commercially available headsets prior to Larkin.

I therefore conclude that Claim 1 is infringed by both the R–70 and the R–71.

E. DEFINITENESS

Roanwell's entire argument with respect to the alleged indefiniteness of Claim 1 consists of a single sentence to the effect that if the claim is interpreted to cover any support means other than the eyeglass frame clip-on structure illustratively disclosed, it would lack the precision required by 35 U.S.C. § 112. That argument is not persuasive. Its uniform adoption would render "means" claims useless and effectively repeal the last sentence of Section 112, a result I cannot accomplish judicially and would not if I could. As the courts have repeatedly observed, no patent would be worth much if its coverage were limited to the precise structure shown in the drawings. Indeed, the doctrine of equivalents was judicially created to protect inventors by broadening the coverage of their patent claims beyond their literal language to encompass structures achieving the same result by similar means. Surely such protection should not be denied one whose claims require no such broadening but are squarely readable on the accused devices.

I conclude that Claim 1 has the definiteness required by Section 112.

II. THE HUTCHINGS UTILITY PATENT

The Hutchings patent U.S. 3,548,118 (the Hutchings utility patent), issued December 15, 1970 on an application filed July 3, 1969, involves a "post-auricular" (behind the external ear) headset which includes a housing curved to fit the contour of the rear surface of the auricle and having at its upper end a hook-shaped projection which engages the upper front edge of the auricle to support the housing against the ear. The housing likewise contains a miniature microphone and receiver. A voice tube extends from the forward end of the portion of the housing which projects above the ear, obliquely downwardly and forwardly to a point adjacent the wearer's mouth, and a flexible, small-diameter ear tube extends from the lower end of the housing, underneath the ear and is provided at its outer end with a plug which fits into the ear canal. The voice tube has telescoping sections to permit adjustment of its length, and its inner end is supported in a ball and socket connection to permit lateral movement of its free or input end for proper positioning relative to the wearer's mouth. Plantronics designated Claim 1 of this patent as typical, and stipulated that the validity of all of the other claims would depend on that of Claim 1; it is set forth in full in the margin.[2] It is charged to be infringed only by the Roanwell R–70.

Roanwell admits that Claim 1, if valid, is infringed by the R–70. As affirmative defenses against the patent and in support of its counterclaim of invalidity, Roanwell asserts obviousness in view of the prior art, fraud on the Patent Office,

2. Claim 1 of the Hutchings utility patent reads:

"1. A headset comprising a housing adapted to be placed behind the ear of a user, said housing including an integral upper curved extension adapted to extend over and engage the top of the ear, a microphone disposed in and near the top of said housing, a forwardly extending voice tube communicating with said microphone and positionably secured to the upper extension of said housing, said voice tube being adapted to have its distal end positioned adjacent the user's mouth, a receiver disposed in and near the bottom of said housing, and a flexible tube secured to the bottom of the housing and adapted to provide communication to the auditory canal of the user's ear."

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and double patenting in view of the design patent.

A. OBVIOUSNESS

Scope and content of the prior art

[3] In its attack on the Hutchings utility patent, Roanwell relies upon the following principal items of prior art in addition, of course, to the Larkin patent:

The Plantronics MS–43 (1962)

In 1961, even before the MS–50 was placed on the market, Plantronics began work on a post-auricular headset having the microphone and receiver contained in a small capsule curved to fit the rear side of the auricle, with an ear tube extending out of its upper end, over the top of the auricle and terminating in a plug fitting into the ear canal, and a voice tube extending from its lower end under the ear and generally horizontally to a point adjacent the corner of the mouth. The first prototype, which was fabricated at Audiotone in Phoenix, Arizona, in the spring of 1962, was produced by modifying an Audiotone Model 77 post-auricular hearing aid. Several units were built and, although none was sold, they were given away and admittedly went into public use in 1962. Thus the unit is part of the prior art from which the alleged advance of the Hutchings patent must be measured. See *Application of Foster*, 343 F.2d 980, 52 CCPA 1808 (1965), *cert. denied*, 383 U.S. 966, 86 S.Ct. 1270, 16 L.Ed.2d 307, *reh. denied*, 384 U.S. 934, 86 S.Ct. 1441, 16 L.Ed.2d 535 (1966).

German provisional patent (DAS) 1,132,973 (1962)

This German patent discloses a post-auricular hearing aid in which the microphone input is through a tube which extends from the top of the capsule, hooks over the top of the auricle and terminates at a point near the center or focus of the auricle, while the ear tube extends from the lower end of the capsule, curves beneath the ear lobe and terminates in a plug fitting into the ear canal.

Flygstad et al. U.S. patent 3,280,273 (1966)

The Flygstad patent, based on a 1963 application assigned to Telex, discloses a post-auricular headset developed at Telex which was substantially identical to the MS–43. Like the MS–43, it was apparently never marketed.

The Oticon hearing aid (1968)

The Oticon device, as illustrated in a 1968 publication, is similar to that shown in the above German patent, except that both the voice tube and the ear tube project from the top of the capsule. This device was widely marketed, and Plantronics acquired one in its development of Hutchings' post-auricular headset.

The Bell System Model 61 headset (1965)

The Model 61 was the end result of a development program begun at Bell Telephone Laboratories in 1963. It became the subject of the Bryant et al. U.S. patent 3,440,365 which Bell Laboratories obtained in 1969 on an application filed in 1965. It had a capsule containing a miniature microphone and receiver removably attached to an interchangeable earmold insert fitting the concha of the ear and having an integral tubular extension fitting into the ear canal and communicating through a passage in the insert with the receiver.

This device was used as standard equipment by operators in the Bell System during the late 1960's. In December 1968, after soliciting quotations from a number of independent suppliers, including Plantronics, Western Electric Co. awarded to Roanwell a contract to supply headsets of this design for use in the Bell System.

The differences between the claimed invention and the prior art

The Plantronics MS–43 and the headset shown in Telex's Flygstad patent each anticipate the complete combination claimed in Claim 1 of the Hutchings utility patent, except for a reversal of parts: the microphone and voice tube are at the top of the capsule and the re-

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ceiver and ear tube are at the bottom, instead of vice versa.

The reverse arrangement was old in the hearing aid art. The German patent shows a hearing aid having the microphone and voice tube at the top of the capsule and the receiver and ear tube at the bottom.

The level of ordinary skill in the art

No significant technical problem was involved in transposing the positions of the voice and ear tubes. Plantronics argues that the increase in the length of the voice tube from about 4" to about 6", which is necessitated by extending the tube obliquely downwardly from the top of the ear to the mouth instead of horizontally from the bottom of the ear, would increase the attenuation to a degree which the art would have considered intolerable prior to Hutchings.

I do not believe that audio technicians would have considered the mere 1 or 2 decibels of added attenuation a significant obstacle. For example, in Bell Labs' concha-mounted Model 61, the voice tube extended from the center of the auricle, a distance almost as great as in Hutchings. Moreover, its outer end was covered by a coil spring having spaced helical windings serving as a puff shield, and just inside its outer end the tube was filled by a disc of porous material, such as sintered stainless steel, to damp any standing wave resonance peaks. These accessories would obviously attenuate the sound waves far more than the mere two inches or so of added length which Plantronics asserts would have deterred the art from adopting an over-ear routing for the voice tube.

[4] Of course, it does not negate patentable invention merely to establish that a desirable goal, *once perceived*, could have been reached by the exercise of routine skill. Patentable ingenuity may be involved in the perception of the goal. See *Timely Products Corp. v. Stanley Arron, supra.*

Thus we must turn to the "secondary considerations" for guidance in resolving the issue of obviousness.

The history of the art

The history of Hutchings of course begins with the history of Larkin. Virtually as soon as the MS-50 hit the market, there were suggestions from a number of sources that a similar capsule supported on the ear, like a hearing aid, would avoid the necessity of wearing an eyeglass frame or a headband. Several others actually developed such devices, using post-auricular hearing aid capsules as a starting point, just as Hutchings did. There were only four possible combinations of voice and ear tube arrangements: both out the top, both out the bottom, the voice tube out the top and the ear tube out the bottom, and vice versa.

The choice apparently depended on the particular hearing aid used. Audiotone started with its Model 77, which had the ear tube at the top and the microphone at the bottom, so in designing the MS-43, naturally found it simpler to extend the voice tube below the ear. One starting with the hearing aid of the German patent would presumably have done the opposite.

After its brief venture with the MS-43, which ended in 1962, Plantronics abandoned all effort to develop a post-auricular headset until the end of December 1968 when, apparently spurred by the threat of competition from Bell Labs' earmold-supported Model 61, it organized a "task force" to reactivate the project. Within a week thereafter, Hutchings had completed sketches of a new design and within another month a working prototype had been completed. This design, which was commercialized as the MS-80 "StarSet," was similar to the MS-43, except that the parts were reversed, with the microphone and voice tube at the top and the receiver and ear tube at the bottom.

Bringing the ear tube out the bottom affords an obvious advantage in stability, since the stiffness of the tube and the fixation of its end plug in the ear canal resists swinging of the lower end of the capsule either outwardly away from the

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plane of the head or rearwardly away from the back of the ear.

However, this enhanced stability has proved of only limited significance insofar as concerns marketability. Roanwell's R-71, which has an under-ear voice tube and is accordingly not charged to infringe either of the Hutchings patents, has enjoyed and still enjoys substantial commercial acceptance in the face of direct competition from Plantronics StarSet and Roanwell's own R-70, both of which have over-ear voice tubes. Indeed, Roanwell's total sales of the R-70 and R-71 are roughly equal, while its sales of the R-71 to users other than Western Electric, which has standardized on the StarSet and uses Roanwell only as a second source, are roughly 6 times as great as its sales of the R-70.

One apparent reason for the continued popularity of the R-71 is that its under-ear voice tube and low-slung capsule create much less interference with eyeglasses and sunglasses.

Thus most of the "signposts" which pointed toward patentability in the case of Larkin are either missing altogether in the case of Hutchings or point in the opposite direction. The record as to Hutchings establishes no long-felt need, no fruitless search, no defiance of ancient prejudices, no instant acclaim, no driving of competitors from the market.

Plantronics urges that Roanwell's flagrant plagiarism of the StarSet is persuasive evidence of patentability. The record does disclose a driving curiosity on the part of Roanwell concerning the "second generation headset" which Plantronics had announced in its quarterly report to stockholders published in the spring of 1969. Immediately thereafter, Roanwell's Vice President Potter, stating that Roanwell "must find out what it is —soon," marshalled a number of Roanwell's personnel in a well-coordinated program of intelligence-gathering which involved interviewing Plantronics' customers and suppliers and even one of its engineers, the latter on the pretext of exploring his availability for employment, and arranging for third parties, posing as potential customers, to make inquiries to Plantronics.

These efforts met with only limited success; Roanwell apparently learned that Plantronics' "second generation headset" employed a post-auricle capsule, but did not discover such details as the over-ear voice tube. Nevertheless, when Roanwell engaged the assistance of Unex Labs in the development of what one of its salesmen candidly termed a "me-too" version, Unex's exploratory sketches included one model having an over-ear voice tube and an under-ear ear tube. It was not until several days later, at an industry show, that the Plantronics StarSet was first publicly disclosed and Roanwell learned the full details of its construction.

[5] When Roanwell finalized the design of its R-70, it doubtless did so conscious of its similarity to the StarSet but, even if it had not already considered the same configuration, among others, before it ever saw the StarSet, it could not be prevented from copying the design of a competitive product on the market, in the absence of a valid patent covering it, or of confusion as to the source of the goods. *Sears, Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225, 84 S.Ct. 784, 11 L.Ed.2d 661 (1964); *Compco Corp. v. Day-Brite Lighting, Inc.*, 376 U.S. 234, 84 S.Ct. 779, 11 L.Ed.2d 669 (1964).

[6] Plantronics further stresses the commercial success of the StarSet as evidence of non-obviousness. But commercial success, while indeed a makeweight for patentability, cannot tip the balance against such heavy evidence of obviousness. *Julie Research Laboratories, Inc. v. Guildline Instruments, Inc.*, 501 F.2d 1131, 1135 (2d Cir. 1974); *Formal Fashions, Inc. v. Braiman Bows, Inc.*, 369 F.2d 536, 539 (2d Cir. 1966).

I conclude that all of the claims of the Hutchings utility patent are invalid under 35 U.S.C. § 103.

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B. FRAUD ON THE PATENT OFFICE

Roanwell urges that the Hutchings utility patent is invalid on the further ground that Hutchings and his attorney misled the Patent Office examiner 1) by arguing that Hutchings was the first to provide an over-ear voice tube, while failing to mention that in his early work Hutchings had used an Oticon post-auricular hearing aid which had a short, curved microphone tube extending from the top of the housing to the focus of the auricle and 2) by arguing that the attachment of the voice tube at the top of the housing would cause the weight of the forwardly extending tube partially to counterbalance the weight of the housing and thus enhance stability, whereas 1) the tube is too light to have any significant counterbalancing effect, 2) the counterbalancing effect of the tube is the same whether it is attached to the top or bottom of the housing, and 3) counterbalancing actually reduces stability by producing a see-saw effect.

Hutchings' failure to mention the Oticon device was surely not for the purpose of deception. As already discussed, the examining division was intimately familiar with the hearing aid art, and doubtless was aware that many of the commercial devices then available had microphone ports at the top of the housing and even tubes extending to the focus of the auricle. But this is not the same as a voice tube cantilevered from the housing and extending some six inches to a point adjacent the wearer's mouth.

Hutchings' arguments about the counterbalancing effect of the voice tube were apparently wrong but surely the result of innocent mistake rather than a conscious effort to mislead a technically trained Patent Office examiner about a matter of elementary mechanics.

[7] In the absence of either an intent to deceive or recklessness, the patent is not invalid for fraud. *Xerox Corp. v. Dennison Mfg. Co., supra.*

C. DOUBLE PATENTING

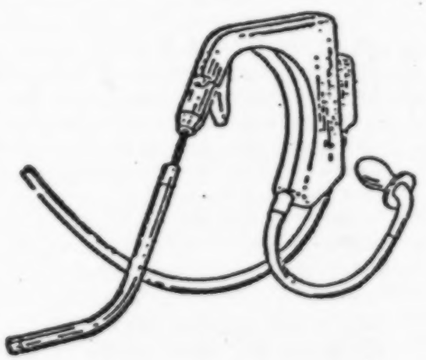
Roanwell argues that the Hutchings utility patent is invalid for the further reason of double patenting, in that the invention claimed is merely the arrangement of the various parts, which is the same subject matter covered by the Hutchings design patent also in suit.

I do not agree. The two patents do not cover the same invention. It is easy to visualize many devices which would infringe the utility patent, yet would create an entirely different visual impact than the patented design; likewise, although it is not so easy, it is possible to conceive useful devices which would embody the design but which would not infringe the utility patent—for example, using a sub-miniature microphone at the end of a boom, having approximately the same overall shape as the voice tube.

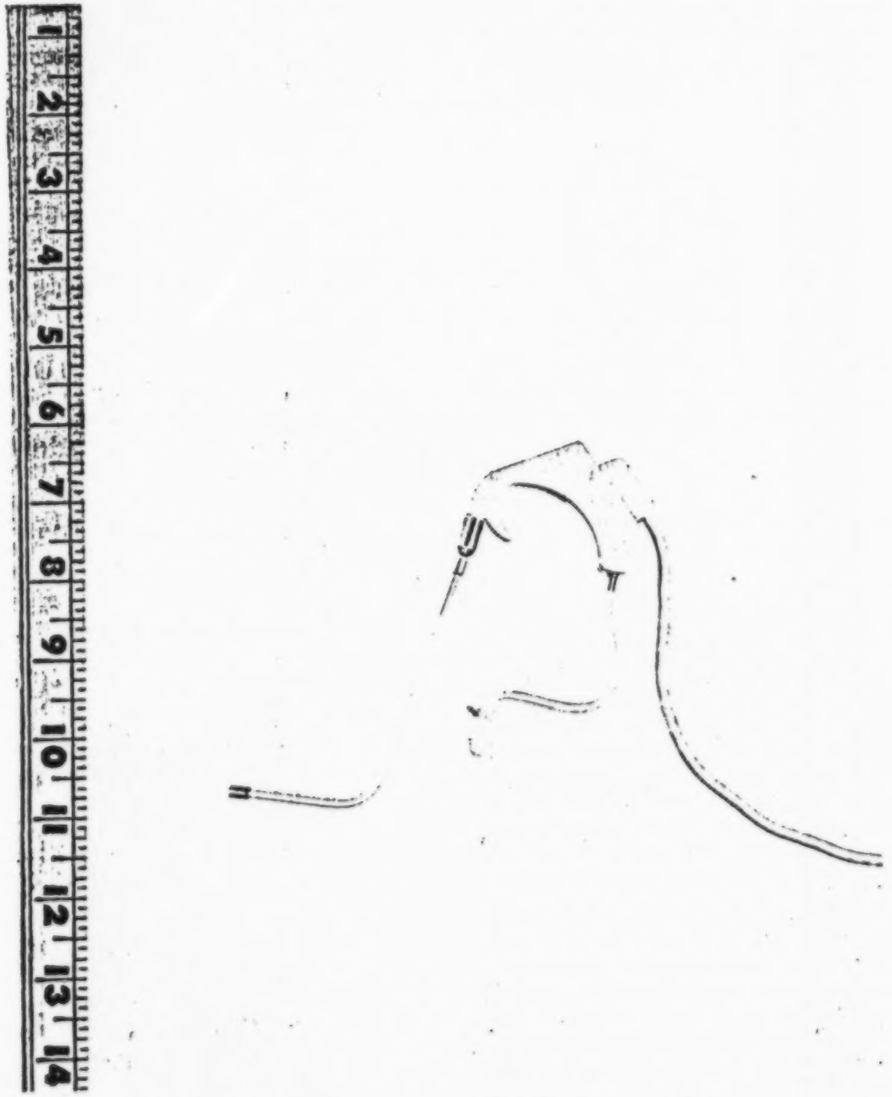
The utility patent is therefore not invalid for double patenting. *Mathieu v. Mitchell Vance Co.*, 7 F.2d 837 (2d Cir. 1925); *Bayley & Sons, Inc. v. Standart Art Glass Co.*, 249 F.478 (2d Cir. 1918).

III. THE HUTCHINGS DESIGN PATENT

[8] The Hutchings U.S. patent No. Des. 218,173 (the Hutchings design patent) was issued July 28, 1970 on an application filed June 16, 1969 and covers the headset design shown below in the patent drawing and in a photograph of the Plantronics MS–80 StarSet which embodied this design:



22a



Plantronics Model 50–80 StarSet

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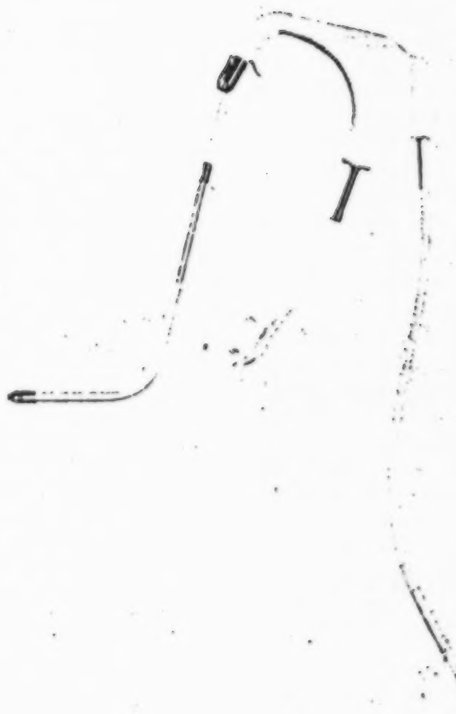
The design patent is charged to be infringed by the Roanwell R–70 headset:



Roanwell denies infringement and asserts, as affirmative defenses, that the patent is invalid on the grounds of obviousness, non-ornamentality or functionality and fraud on the Patent Office.

A. PRELIMINARY INQUIRIES

The prior art

The following illustrations show the closest items of prior art relied on by Roanwell:

Flygstad U.S. patent 3,230,273 (1966):

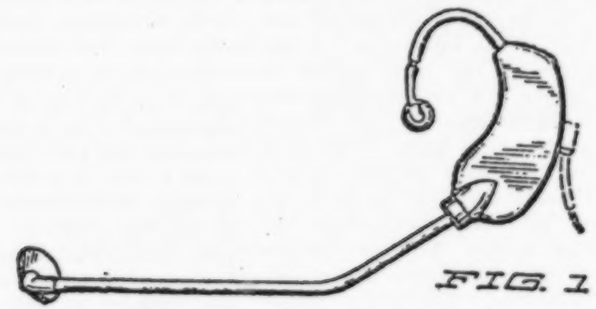
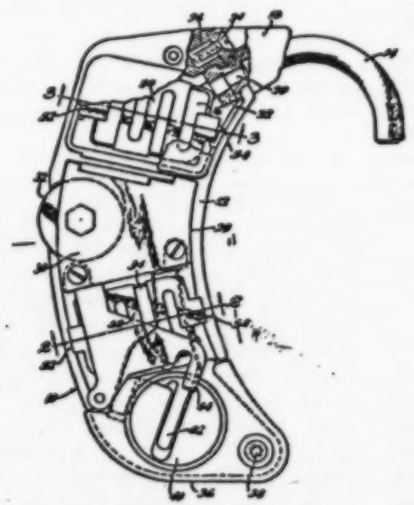


FIG. 1

Ex. R–1

Weiss U.S. patent 3,019,306:



The differences

Plantronics emphasizes, as novel features of the patented design, 1) the "angular" appearance resulting from the fact that all of the edges seen in elevational view, excepting only the ear-fit inner curve, are substantially planar; 2) the narrowed hook-like prong projecting inwardly from the under side of the forward projection at the upper end of the housing; and 3) the wide metal ferrule at the outer end of this rather long, straight cylindrical projection, with the voice tube extending axially from it.

None of these three features is precisely shown in any of the prior art patents or publications in evidence.

Weiss has a flat top which adjoins the back at a relatively sharp angle; but the back is curved so as to be spaced equidistantly from the ear-contour inner surface. Flygstad has a metal ferrule around the voice tube, but it is narrow and it completely covers a short cylindrical projection.

Moreover, none of the prior art designs creates the same overall visual impression. To some viewers, their appearance may be just as pleasing. But Roanwell has chosen a design which is clearly much

closer to that of the "StarSet" than to the prior art. So close, in fact, that the conclusion of deliberate copying seems inescapable.

B. INFRINGEMENT

The only significant differences between the patented design and the R–70 reside in the lengths of the several side sections and of the cable plug. In the patented design, the back section is slightly longer and the adjoining sections are slightly shorter. The plug is also shorter, which leaves substantial portions of the back section exposed above and below the plug. In the R–70, the longer plug completely covers the shorter back section. But these differences are minor in comparison to the many similarities. The overall visual effects of the two are strikingly similar.

Roanwell's designated deponent, Hans Mol, in comparing the patented design with that of the R–70, admitted that, "To the average layman they would look substantially the same."

This satisfies the test of design patent infringement laid down by the Supreme Court in *Gorham v. White*, 81 U.S. 511, 14 Wall. 511, 20 L.Ed. 731 (1872), namely whether "in the eye of the ordinary observer, given such attention as a purchaser usually gives, two designs are substantially the same." The same test has been applied in this Circuit. *International Silver v. Pomerantz*, 271 F.2d 69 (2d Cir. 1959).

I find that the R–70 infringes the Hutchings design patent.

C. FUNCTIONALITY

The prong and the ferrule are clearly functional. Indeed their only apparent *raison d'etre* is utility and not decoration. The prong hooks over the upper front edge of the auricle to prevent the housing from falling off the back of the ear. Even the narrowing of the prong serves the obvious utilitarian purpose of fitting comfortably into the narrower lower portion of the space between the upper front edge of the auricle and the surface of the head. The ferrule fits over the end of the forward projection on the housing and is provided with a bayonet slot engaging a pin on the projection for removably attaching the voice tube to the housing.

Omitting these clearly functional features leaves the "angular" look as the only purely decorative feature.

I am not persuaded by Roanwell's argument that the angular look is also functional because the square microphone fits precisely into the relatively sharp right angle at the upper outside corner of the housing. When the microphone is oriented to achieve this fit, its two opposite sides are angled away from the inner surface of the housing, with a resulting wastage of interior space. The spatially most economical shape of the housing would obviously be one in which the outside surface is "parallel" to—i. e., equidistant from—the inner surface and the microphone is oriented so that two of its opposing flat surfaces are aligned as closely as possible with both the inner and outer surfaces of the housing.

The angular contour of the upper corner of the housing is thus anti-functional and defiantly decorative.

D. OBVIOUSNESS

Unfortunately, in an action for infringement of a design patent there are rarely any of the "signposts" of patentability which enable an objective evaluation of the obviousness *vel non* of utility inventions. Since the design patent covers only optional esthetic features, there is never a long-felt need or an unsuccessful search, and it is rarely possible to allocate the specific portions of the profits on a commercial product which are respectively attributable to its utilitarian advantages and to its visual appeal. Thus, in the final analysis, a court's evaluation of the patentability of a design is essentially subjective and personal artistic tastes

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are unpredictable and inexplicable—one viewer's mural is another's graffiti.

Giving a functionally curved device an "angular" look by straightening its surfaces is a device almost as old as the art of design itself. A rectangular wrist watch case is but one of a legion of examples that could readily be called to mind. But there likewise is an endless variety of different ways in which the headset housing could be given an "angular" look—an infinite permutation of the number of planar side sections, of the ratios of their respective lengths, and of the angles between them. The particular combination chosen by Hutchings is pleasing enough, but no more so than any of thousands of others which he might have chosen. I cannot believe that any artistic talent beyond that of a designer of ordinary skill in the art was required. The record does not reflect that Hutchings had any design training or experience whatever. Of course, this by no means disqualifies him to receive a design patent. Doubtless there are many potential Rembrandts whose hands have been fated to hold scalpels or even shovels rather than paint brushes. But it is at least some evidence that only routine skill was involved in his design of the StarSet housing.

Moreover, if there could be any patentability in the design, it would have to reside not in the broad and notoriously old concept of "angularity" but in the particular number of planar side sections and of the ratios of their respective lengths. As already noted, while the Roanwell R–70 housing has the same number of side sections, it has a shorter back section and longer adjoining sections than the Hutchings design, and the plug covers the entire back section. If the Hutchings patent were given a sufficiently narrow interpretation to preserve its validity, it would not be infringed by the R–70.

I conclude that the Hutchings design patent is invalid for obviousness under § 103.

E. FRAUD ON THE PATENT OFFICE

[9] Roanwell contends that, after the Patent Office examiner failed to cite against the application for the design patent any prior art showing post-auricle headsets, Hutchings and his attorney should have called to his attention the Flygstad patent of which they were well aware and which they had called to the attention of the examiner handling the application for the Hutchings utility patent.

I do not find that this failure amounted to fraud. The Hutchings design application did not cover post-auricle headsets *per se*, but only the specific design shown. Flygstad's headset embodied an entirely different design with a long curved back surface merging smoothly with a more abruptly curved bottom surface. It lacks the angular appearance which characterizes the patented design. Its citation to the Patent Office would not likely have affected the prosecution of the Hutchings application, and its withholding was apparently without any deceptive intent.

IV. ATTORNEY'S FEES

[10] Both parties have sought an award of their attorney's fees. However, I find nothing which renders this case "exceptional" within the contemplation of 35 U.S.C. § 285. None of the plaintiff's claims and none of the defenses was sham or frivolous; all were clearly asserted in good faith and with obvious conviction; the trial was conducted expeditiously and with great skill on both sides; and, typically of the patent trial bar, counsel were not only courteous, but admirably cooperative in discovery and in entering into stipulations of fact which materially shortened the trial. No attorney's fees are awarded.

V. SUMMARY

Claim 1 of the Larkin patent is valid and infringed by the Roanwell R–70 and R–71 headsets. All of the claims

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of the Hutchings utility patent are invalid. The Hutchings design patent is invalid but, if valid, would be infringed by the Roanwell R–70 headset.

Plantronics is entitled to an injunction restraining further infringement of Claim 1 of Larkin for the remainder of the term thereof and, if the parties cannot compromise the matter, to an accounting of damages for past infringement.[3] Plantronics' counsel should prepare a proposed judgment order and submit it to Roanwell's counsel for approval as to form.

UNITED STATES of America, Plaintiff,

v.

The FEDERAL COMPANY, Defendant.

No. C–72–382.

United States District Court, W. D. Tennessee, W. D.

June 30, 1975.

Government filed civil antitrust complaint alleging that corporation's acquisition of flour-milling business through corporation's flour-milling subsidiary violated the Clayton Act. The District Court, McRae, J., held that family flour and bakery flour, but not wheat flour, were lines of commerce within meaning of the Clayton Act; that the southeastern United States was a "section of the country" within which the effect of the acquisition on competition in sale of family flour and bakery flour might appropriately be measured; and that government failed to show by preponderance of evidence that acquisition of the flour-milling business was likely substantially to lessen competition in sale of family flour or bakery flour in the southeastern United States.

Judgment for defendant.

1. Monopolies ⇐20(8)

Both family flour and bakery flour were a "line of commerce" within meaning of Clayton Act for purpose of measuring the anticompetitive effect of defendant corporation's acquisition of flour-milling business through its flour-milling subsidiary. Clayton Act, § 7, 15 U.S.C.A. § 18.

See publication Words and Phrases for other judicial constructions and definitions.

2. Monopolies ⇐20(7)

The southeastern United States was a "section of the country" within meaning of the Clayton Act within which the effect of corporation's acquisition of flour-milling business through its flour-milling subsidiary on competition in the sale of family flour and bakery flour could appropriately be measured. Clayton Act, § 7, 15 U.S.C.A. § 18.

See publication Words and Phrases for other judicial constructions and definitions.

3. Monopolies ⇐24(13)

Government which brought civil antitrust complaint failed to show by a preponderance of the evidence that defendant corporation's acquisition of flour-milling business through its flour-

3. In connection with Plantronics' claim for treble damages, I find that Roanwell's infringement of the Larkin patent was not deliberate and willful because Roanwell relied upon the advice of able outside counsel that all of the claims of the patent which did not recite the mask were invalid. Following the trial, Plantronics moved to strike the portion of Roanwell's answer which alleges that it acted upon the advice of counsel, on the ground that Roanwell did not offer at the trial any evidence to support that allegation but instead asserted an attorney-client privilege with respect to all communications between it and its attorneys. I find, to the contrary, that Roanwell did introduce, as defendants' Exhibit KK, a letter dated August 19, 1965 from its patent counsel advising that the Larkin patent is invalid in view of the prior Pritchett and Dreher patents.

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Appendix C

ly we uphold the dismissal of Plaintiff's Jones Act claim on the ground of insufficiency.

[5] The district court's conclusion that it was not a convenient forum for the litigation of Plaintiff's cause of action under the General Maritime Law may not be disturbed unless that court abused its discretion. *Fitzgerald v. Texaco, Inc.*, 521 F.2d 448, 451 (2d Cir. 1975), *cert. denied*, — U.S. —, 96 S.Ct. 781, 46 L.Ed.2d 641 (1976); *Fitzgerald v. Westland Marine Corp.*, 369 F.2d 499, 502 (2d Cir. 1966). Here, the dismissal would not operate to foreclose all possibility of a remedy,[22] nor is there any evidence that plaintiff would be put to unreasonable expense by litigating his claim in his native land, as opposed to a court in a country with which he apparently has no ties. *See, Fitzgerald v. Texaco, Inc., supra* at 521 F.2d at 451–452. Since Plaintiff received medical treatment for his injuries both in the United States and Greece, suit in either country will involve problems in the presentation of medical testimony. Moreover, although Plaintiff claims that the crewmen of the INTREPID are more easily deposed in this country, we discern nothing in the record which supports this claim. On the contrary, the seamen in question are all aliens and presumably have neither a residence in, nor substantial contact with, the United States. The availability of compulsory process is therefore questionable. *See, Fitzgerald v. Texaco, Inc., supra* at 451–452.

[6] Balancing the factors contained in the record, we conclude that a dismissal of this essentially foreign lawsuit was well within the bounds of the district court's discretion. The Plaintiff's claims are more properly addressed to the courts of Greece.

Accordingly, the judgment of the district court is affirmed and the complaint is hereby dismissed.

22. Plaintiff's argument that Greek law would be less favorable to him is without merit, for "[a] district court has discretion to dismiss an action under the doctrine of *forum non conveniens* . . . even though the law applicable in the alternative forum may be less favorable to the plaintiff's chance of recovery." *Fitzgerald v. Texaco, Inc., supra*, at 521 F.2d 453 (citations omitted).

PLANTRONICS, INC., Plaintiff-Appellant and Cross-Appellee,

v.

ROANWELL CORPORATION, Defendant-Appellee and Cross-Appellant.

Nos. 835, 836, Dockets 75–7621, 75–7645.

United States Court of Appeals, Second Circuit.

Argued May 28, 1976.

Decided June 15, 1976.

Action was brought challenging infringement of two utility patents and design patent relating to lightweight headsets as used by airplane pilots and air traffic controllers. The United States District Court for the Southern District of New York, William C. Conner, J., 403 F.Supp. 138, entered judgment relating to validity of patents and parties appealed. The Court of Appeals held that utility patent No. 3,184,556 for miniature headset-microphone was valid and infringed; that utility patent No. 3,548,118 for self-supporting headset and design patent No. 218,173 for combined microphone and receiver instrument were invalid for obviousness.

Affirmed.

1. Patents ⇐328(2)

Utility patent No. 3,184,556 relating to miniature headset-microphone adapted for use with a mask was valid and infringed.

2. Patents ⇐328(2)

Utility patent No. 3,548,118 relating to self-supporting headset for airplane pilots and air traffic controllers was invalid for obviousness.

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3. Patents ⇐328(1)

Design patent No. 218,173 relating to lightweight headset featuring combined microphone and receiver instrument was invalid for obviousness.

Tom Arnold, Paul M. Janicke, Houston, Tex. (Arnold, White & Durkee, Houston, Tex., Brumbaugh, Graves, Donohue & Raymond, Robert Neuner, New York City, of counsel), for plaintiff-appellant and cross-appellee.

Charles W. Bradley, New York City (Cooper, Dunham, Clark, Griffin & Moran, Lester W. Clark, New York City, of counsel), for defendant-appellee and cross-appellant.

Before HAYS, MULLIGAN and MESKILL, Circuit Judges.

PER CURIAM:

Plantronics, Inc. brought an action in the United States District Court for the Southern District of New York for infringement of two utility patents and a design patent which it owned relating to lightweight headsets as used by airplane pilots and air traffic controllers. The defendant Roanwell Corporation is also in the business of manufacturing and selling headsets. The patents owned by plaintiff and the allegations of infringement are:

1. Larkin patent 3,184,556, for a "Miniature Headset-Microphone Adapted For Use With A Mask", filed December 11, 1961, issued May 18, 1965; charged to be infringed by defendant's R-70 and R-71 headsets.
2. Hutchings patent 3,548,118 for a "Self-Supporting Headset", filed July 3, 1969, issued December 15, 1970; charged to be infringed by defendant's R-70 headset.
3. Hutchings design patent Des. 218,173 for a "Combined Microphone And Receiver Instrument", filed June 16, 1969, issued July 28, 1970; charged to be infringed by defendant's R-70 headset.

[1-3] After a five-day bench trial, Hon. William C. Conner, *District Judge*, held the Larkin patent in suit to be valid and infringed and the two Hutchings patents in suit to be invalid for obviousness under 35 U.S.C. § 103. Judge Conner's opinion is reported at 403 F.Supp. 138 (S.D.N.Y.1975). The plaintiff has appealed from the holding of invalidity of the two Hutchings' patents and the defendant has appealed from the holding of validity and enforceability of the Larkin patent. We are persuaded that Judge Conner's lucid and complete opinion below properly determined all of the issues raised in this litigation. The record amply supports the finding that the Larkin patent constituted a major breakthrough in the art for lightweight headsets and was not anticipated by prior patents relied on by Roanwell. With respect to the Hutchings utility patent, we are also persuaded that it was obvious from the state of the art at that time as found below. While the Hutchings StarSet (which embodied the patent) met with more commercial success than attributed by Judge Conner, as conceded by the defendant, this is of secondary consideration on the issue of obviousness. *Maclaren v. B-I-W Group, Inc.*, 535 F.2d 1367, 1376 (2d Cir. 1976). Moreover, there is no showing in the record that its commercial demand depends upon its 'over-the-ear' feature as distinguished from defendant's 'under-the-ear' units. In view of the ample evidence of obviousness, plaintiff's arguments concerning secondary factors are not persuasive. Similarly, we find no error of fact or law with respect to the finding of obviousness as to the Hutchings design patent.

The judgment is therefore affirmed on the opinion below.

Appendix D

United States Court of Appeals

SECOND CIRCUIT

At a Stated Term of the United States Court of Appeals, in and for the Second Circuit, held at the United States Court House, in the City of New York, on the second day of July , one thousand nine hundred and seventy-six.

Present: HON. PAUL R. HAYS,

HON. WILLIAM H. MULLIGAN,

HON. THOMAS J. MESKILL,

Circuit Judges.

Plantronics, Inc., Plaintiff-Appellee-Appellant, v. Roanwell Corporation, KMT Corporation and Roanwell Telephone Supply, Defendants, Roanwell Corporation, Defendant-Appellant-Appellee.	75-7621 75-7645

A petition for a rehearing having been filed herein by counsel for the defendant-appellant-appellee Roanwell Corporation,

Upon consideration thereof, it is

Ordered that said petition be and hereby is denied.

A. Daniel Fusaro

A. DANIEL FUSARO
Clerk

D

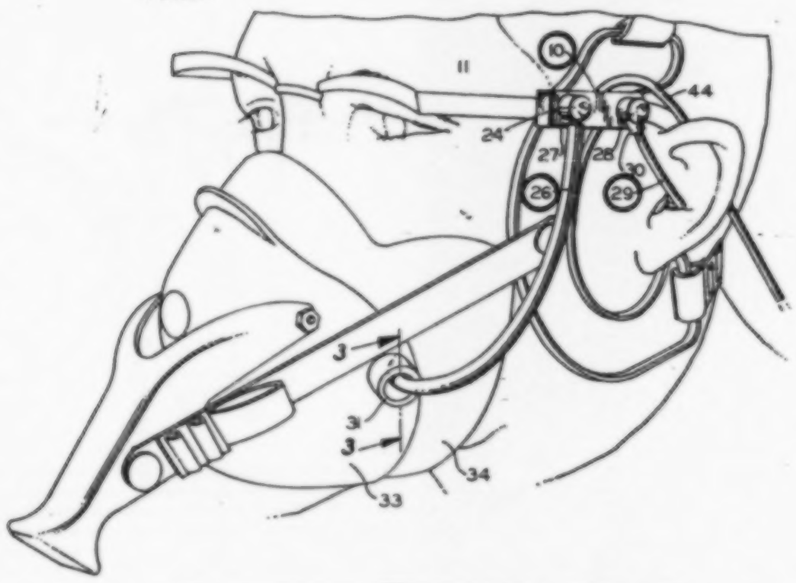
Appendix E

May 18, 1965 W. K. LARKIN 3,184,556

MINIATURE HEADSET-MICROPHONE ADAPTED FOR USE WITH A MASK

Filed Dec. 11, 1961 2 Sheets-Sheet 1

FIG_1



Legend:

26 Voice Tube

29 Ear Tube

10 Housing for Mike + Receiver

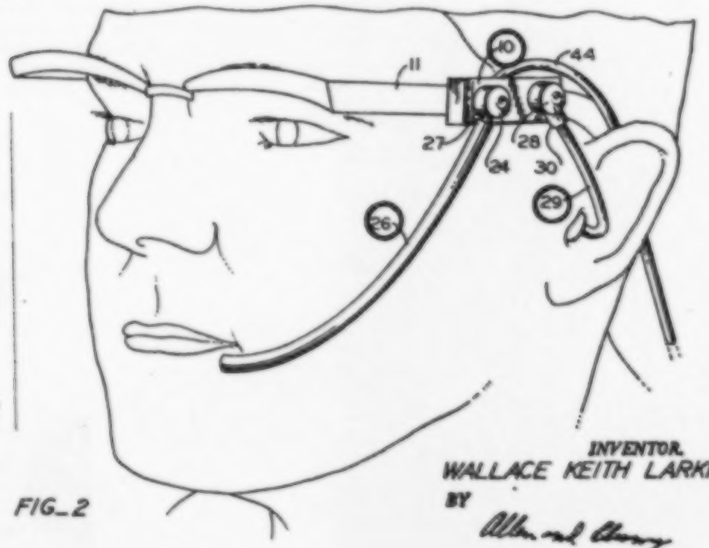


FIG_2

INVENTOR.
WALLACE KEITH LARKIN
BY
ATTORNEYS

Ex. App. 2

May 18, 1965 W. K. LARKIN 3,184,556

MINIATURE HEADSET-MICROPHONE ADAPTED FOR USE WITH A MASK

Filed Dec. 11, 1961

What I claim is:

1. A miniaturized microphone headset employing a miniature microphone and a miniature receiver, comprising the combination of support means for detachably supporting the miniature microphone and the miniature receiver adjacent to the wearer's ear, a first acoustical tube, means for attaching one end of said first tube to said microphone and the other end of said first tube being adapted to be positioned adjacent to the wearer's mouth, a second acoustical tube, and means for attaching one end of said second tube to said receiver and the other end of said second tube being adapted to be plugged into the wearer's ear.

Appendix F

Oct. 18, 1949. B. OLNEY ET AL 2,485,405

DIPOLE MICROPHONE

Filed April 21, 1944 6 Sheets-Sheet 1

Fig.3

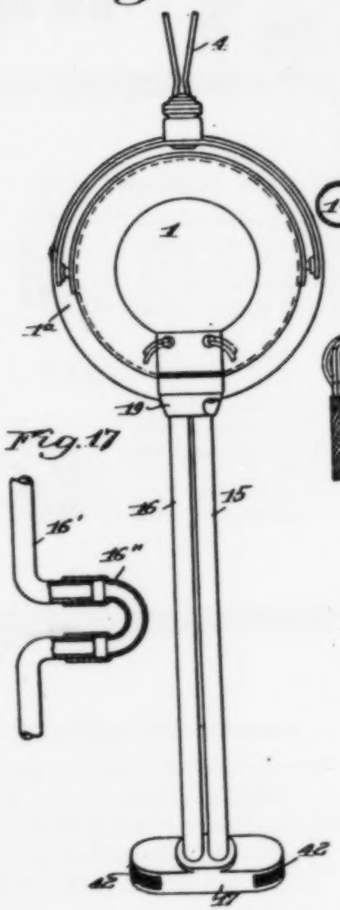


Fig.2

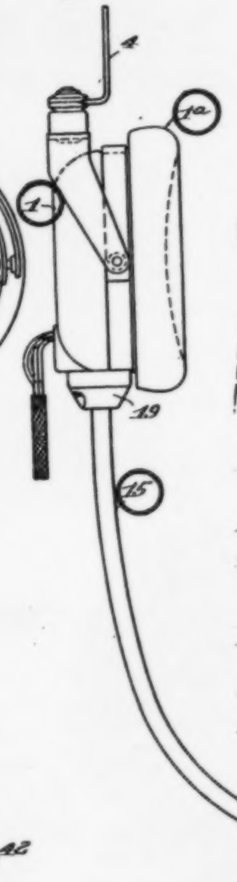


Fig.1

Legend:

1a Earcap

1 Housing for Mike + Receiver

15 + 16 Voice Tubes

(can use 1 or 2 tubes)*

17 Mouthpiece

(removed when only 1 tube is used)*

* Ex. App. 653

Fig.4

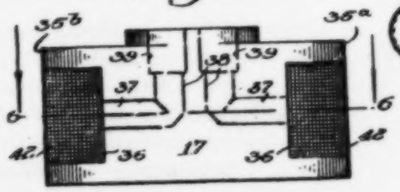
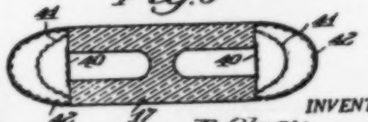


Fig.6



INVENTORS

B. Olney

F. H. Slaymaker

BY W. F. Meeker

D. Clyde Jones

their Attorney

Ex. App. 643

Appendix G

HEADSET NEWS! NOTHING TOUCHES THE EAR WITH

NEW TELEX® TWINSET

Ends Headachy Ear Pressure

Twinset receivers rest lightly at the temples—not jammed over the ears. Tubular sound arm pipes signal *into* the ears—chafing, pressure, "top-heavy" feeling banished forever!

Weighs Only 1.6 Oz.

Twinset is the lightest twin magnetic-receiver headset ever made! Of rugged Tenite and bright nickel throughout. New Monocord replaces "Y" cord connection to receivers—another *Twinset* first!

Blocks Out Background Noise

Plastic ear tips adjustable to fit ear opening snugly, comfortably. Room noise and clatter silenced! Less signal loss, for sound is delivered closer to the ear drum. Signal goes *into* the ear—not *at* it!

Listening Fatigue Banished

Matched, in-phase magnetic receivers deliver pure, non-resonating signal. Listen hour after hour with *Twinset* without tiring. Precision electrical design throughout!

A BASIC Headset Improvement...

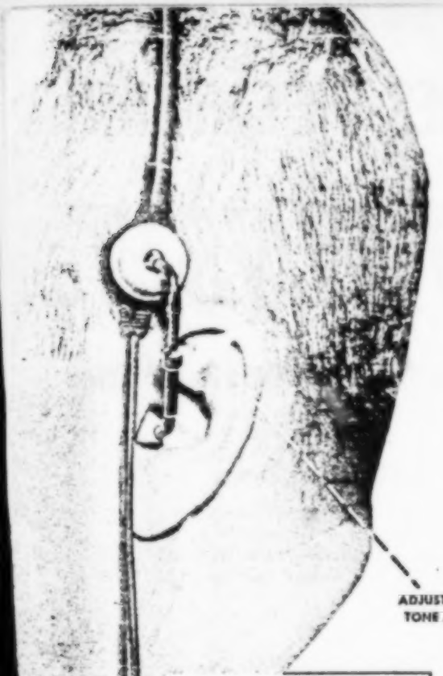
Telex *Twinset* is an entirely new way to hear with a headset! You forget you're wearing it. Never before such comfort, lightness, all-day-long ease of use.

Does A Headset Job BETTER...

Twinset combines performance—sensitivity, high-fidelity, precision construction—with unique improved design. *Twinset* fits any shape head, fits *any* headset installation—commercial, experimental, amateur or business. Featherlight, yet built specifically for constant heavy duty use!

For more details TURN PAGE

G



TELEX® TWINSET pipes signal directly into the ear....

CAA APPROVED (CAATC-3R2-1)

TELEX *Twinset* is a simple yet amazing improvement in listening comfort.

No heavy, sweaty ear cups cover the ear. *Twinset's* matched magnetic receivers rest on the temples —*away* from the ear. Actual sound is piped into the ear through a slender, tubular sound arm mounted on a ball-and-socket joint.

Sound arm and ear tip are adjustable to fit *into* the ear—blocking out background noise completely, giving you more power on weak signals. If preferred, ear tip may float a fraction of an inch away with *nothing whatever touching the ear!*

Telex *Twinset* is fully adjustable to fit any head shape, any ear size. Listen with one or both ears. Move your head, walk around—*Twinset* stays with you without pressure or top-heavy feeling. Remember that weight: only a fraction over an ounce!

Superb performance is built into *Twinset*. Both the magnetic receivers are in phase. Excellent sensitivity combined with full range high-fidelity makes *Twinset* perfect for communications and experimental installations.

***Twinset* can take abuse!** Receivers are sealed against dust and corrosion —chrome-plated, weighted diaphragm is rust-proof, too. Rugged Z-nickel steel head band, encased in Tenite plastic, is so flexible you can coil up *Twinset* and stuff it in your pocket. Single 5-foot Monocord connects to either receiver—stays out of the way better than old-style "Y" cords.

SCORES OF TWINSET USES... COMMERCIAL, EXPERIMENTAL, AMATEUR, BUSINESS OFFICE

For Better Listening . . . Specify Telex Twinsets in:

- Amateur Communications
- Commercial Communications
- Pilot and Control Tower
- Ship's Radio
- Broadcast Monitoring
- Electronic Labs
- Code Practice Schools
- Stenographic Transcribing
- Police and Taxi Dispatching
- Phone-order Boards
- Theaters
- Record Stores
- Wired Music Installations
- Hospitals

Listen Comfortably...Privately...Efficiently...with TELEX TWINSET -the Improved, Modern Headset

TELEX • MONOSET • DYNASET • EARSET • MINI-MIKE
TELE SET • MAGIC MIKE • TELETWIN
All are registered trademarks of

TELEX®
Electro-Acoustic Division
Telex Park, St. Paul 1, Minnesota

Also Manufacturers of:
World's Finest Precision Hearing Aids, Pillow Speakers, Twinsets, Ecomtype Headsets, TV Listeners and Precision Miniature Electronic Equipment and Components, Miniaturization and Encapsulation for Industry.

TELEX TWINSET SPECIFICATIONS

- **SENSITIVITY—**
  101 d.b. above .000204 dynes per sq. cm. for 10 microwatts input
- **IMPEDANCES—**
  1000 ohms—(brown)
  64 ohms—(yellow)
  The above impedance color coding is visible inside the female plug socket.
- **CONSTRUCTION—**
  Weight: 1.6 oz.
  Tough, durable Tenite plastic and bright nickel for all major parts.
  Headband of Z-nickel steel wire encased in flexible plastic.
  Single 5-foot Monocord plugs into either receiver.
  Special cord with built-in miniature volume control also available.

HOW TO ORDER

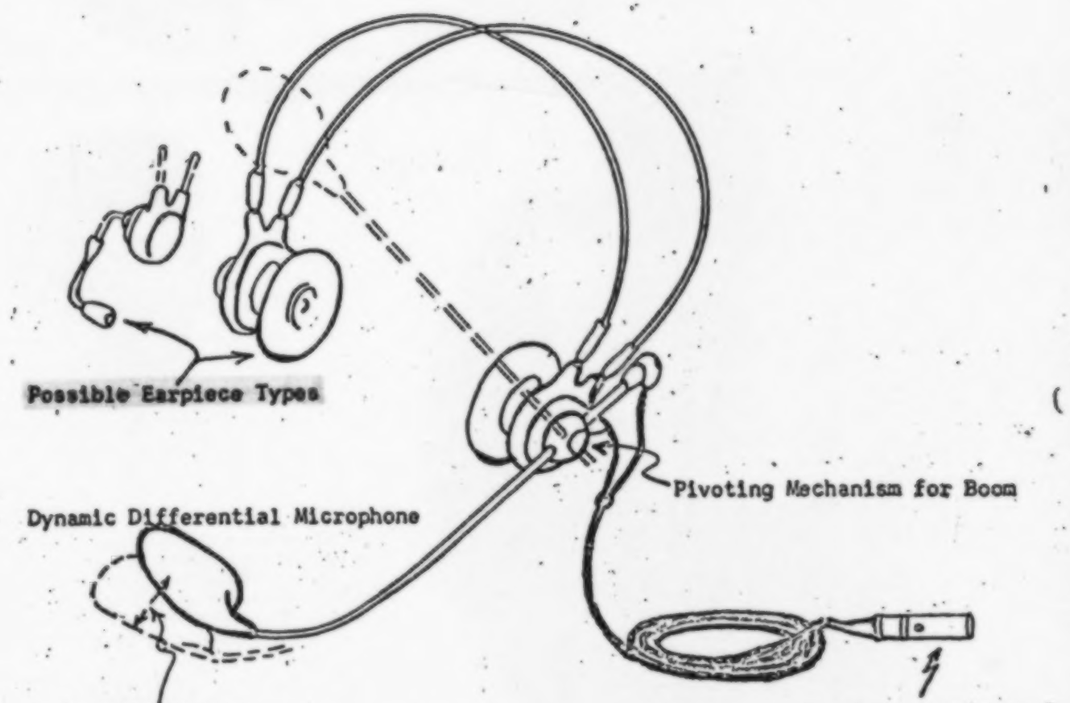
#3775 TWINSET—Complete with 5 Ft. Monocord—(1,000 ohm) CAA Approved
#3791 TWINSET—Complete with 5 Ft. Monocord—(64 ohm)
#3776 TWINSET—less cord (1,000 ohm) CAA Approved
#3781 TWINSET—less cord (64 ohm)
#3280 MONOCORD only.

WORLD'S FINEST PRECISION HEARING AIDS
TELEX®
ELECTRO-ACOUSTIC DIVISION
DISTRIBUTED BY

Printed in U.S.A. 381008 (Rev. 10-55)

Appendix H

ATTACHMENT I



One Possible Arrangement for Light-Weight Headset and Boom Microphone

Sketch Based on FAA Drawing 707-1

Ex. App. 690

H

BOOM-MIKE HEADSET This lightweight, 3½-ounce, two-way headset is ideally suited to airline, ham radio, television, ship-to-shore and switchboard use. Parallel connected 500-ohm receivers are mounted on stainless spring-steel headband. Adjustable tone arms transmit sound directly to ears—no heavy, sweaty cans. Mike is mounted in shock absorbing tenite at end of fully adjustable boom—angled for best pickup. Choice of general purpose 50 ohm carbon mike (output 30 db above 1MV) or 256-ohm noise cancelling differential magnetic mike (output—85 db below 1 Volt/Microbar).

BE SURE TO ORDER BY CATALOG NUMBER

Stock Number		Catalog Number Carbon Mike	Catalog Number Noise Cancelling Mike
18260	Headset w/double receivers & 5' cord w/terminal clips less plug	BCW-12	BMW-12
18250	Headset w/single receivers & cord as above	BCW-11	BMW-11
18240	Headset w/no receivers, mike only & cord as above	BCO-1	BMO-1
18230	TV type headset w/double receivers, split phone & cord as above	BCW-13	BMW-13
18200	Headset w/double receivers, no cord	BCW-02	Not Available
18220	Headset w/single receiver, no cord	BCW-01	"
18235	Headset—split phone, no cord	BCW-03	"
Lugs	Cord unit w/term. packed separately, no plug	CME-1	"
9251	Aircraft-type cord w/PL-55 and PL-68 or equiv.	CME-5	"
12061	Aircraft-type cord w/push-to-talk switch	CME-3	"
9262	Standard cord w/PL-68 or equiv.	CME-2	"
Lugs	Switchboard-type cord w/standard plug	CME-4	"
Lugs	"Y" cord, 6 conductor, for headset #18235 w/term. packed separately, no plug	CME-06	
3230-22	*Cord unit for receivers for noise cancelling mike equipped headsets (order plug separately)	CMM-1	

Appendix I

MONOSET* Here's the ORIGINAL under-chin, lightweight headset. Ideal for listening systems, business machines, radio and record listening, broadcasting, and nearly any other application. Weighing only 1.2 oz., it is complete with 5' cord and standard phone plug. Sensitivity is 88 db above. 0002 dynes per sq. cm. for 10 microwatts input. Frequency response: 100 to 6500 cycles.

Stock Number		Catalog Number
#18183	MONOSET, 128 ohm, complete, std. cord	HMV-2
#18184	MONOSET, 2000 ohm, complete, std. cord	HMV-2
#18185	MONOSET, 128 ohm, with volume control cord	HMV-7
#18186	MONOSET, 2000 ohm, with volume control cord	HMV-7
#18110	MONOSET, 128 ohm, NO CORD	HMV-01
#18165	MONOSET, 2000 ohm, NO CORD	HMV-01
# 9241	CORD, Standard (for metal monoset)	CMT-2
# 3230	CORD, Standard (for plastic monoset)	CMM-2

TELEX

superior quality

• LISTENING DEVICES • ACCESSORIES

• HEADSETS • SUB-MINIATURE COMPONENTS

TELEX *Electro-Mechanical Acoustic Division*

TWINSET* Perfect for amateur, commercial, and industrial communications, the Twinset is CAA approved and is standard equipment on airlines and private planes. Comfort replaces listening fatigue. Adjustable tone arms pipe sound into ears, blocking out background noise, yet ear-tips need not even touch user's ear. Weighs 1.6 oz. and has 5' cord and standard phone plug. Special cord with built-in miniature volume control also available.

Sensitivity is 101 db above .0002 dynes per sq. cm. for 10 microwatts input.

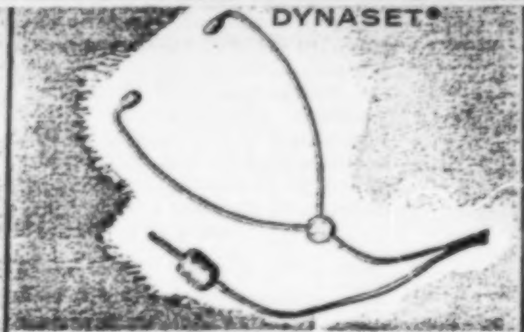
Stock Number		Catalog Number
#3791	TWINSET, 64 ohm imp, complete, std. cord	MTL-2
#3775	TWINSET, 1000 ohm imp, complete (CAA app.), std. cord	MTX-2
#3781	TWINSET, 64 ohm imp, LESS CORD	MTL-01
#3776	TWINSET, 1000 ohm imp, LESS CORD (CAA app.)	MTX-01
#3946	Volume Control Cord, 64 ohm imp	VVM-2
#3945	Volume Control Cord, 1000 ohm imp	VXM-2

Ex. App. 676A

Sound reaches one ear before the other ear to provide "depth of sound" and 30% better understanding. Ideal for secretaries, order board operators, monitoring, etc. Weight of only ½ oz. Replaceable foam eartips assure maximum comfort. Standard phone plug and 5′ cord included.

Sensitivity provides comfortable listening at 1 milliwatt input. Frequency response: 50 to 5,000 cycles. The Tele-Fi chin band is useable with all Telex transistor receivers.

Stock Number	Catalog Number
#18135—TELE-FI, 15 ohm, std. cord	HFR-91
#18035—TELE-FI, 128 ohm, std. cord	HFV-91
#18020—TELE-FI, 1000 ohm, std. cord	HFX-91
#18160—TELE-FI, 2000 ohm, std. cord	HFY-91



Pleasing tone quality important to all users, extremely light weight! Excellent for all types of radio, record, and listening uses, the Dynaset also is ideal for phone-order boards, office machines, and commercial applications. Sound is conducted through long-life flexible tubing from receiver built into the special plug. Sensitivity is 105 db above .0002 dynes per sq. cm. for 1 milliwatt power input. Recommended maximum input: 25 mw. Frequency response: 50 to 8,000 cycles. Weighs 1.25 oz. and comes complete with special plug and acoustic tube.

Stock Number	Catalog Number
6701-P—DYNASET, impedance 6 ohms	HUP-01

Unique muff-type headset used extensively for electric organ practice. Also popular in office, shop, studio, or lab. The receiver is in the special plug, and sound is piped through acoustic tubing to the thin Plexiglas ear cushions. Total weight only 1.6 oz. Special plug and 5′ acoustic tube included.

Stock Number	Catalog Number
#8825—TELE-SET, Complete, 128 ohm	HSV-01
#9316—TELE-SET, Complete, 2000 ohm	HSY-01

TELEX superior quality headsets and accessories

PILLOW SPEAKERS

Comfortable radio, sound, tape recorder or TV listening through pillow. Popular in hospitals and homes because you listen without disturbing others, also for learn-while-sleep applications. DYNAMIC type features stainless steel housing with a hanger. Weighs 4 oz. and measures 3¼″ x 1⅛″. MAGNETIC type has unit molded maroon case. Diaphragm is rust and moisture proof and hermetically sealed. Can be sterilized by submerging in alcohol. Weighs 2.6 oz. and measures 2¼″ x ⅝″. BOTH TYPES come with 5′ cord and standard phone plug. Miniature plug available. Sensitivity of Dynamic Speaker is 1 milliwatt input to speaker for comfortable listening level.

Stock Number	Catalog Number
#8110—DYNAMIC PILLOW SPEAKER, 3.2 ohm imp.	SDN-2
#8130—DYNAMIC PILLOW SPEAKER, 10,000 ohm imp.	SDM-2
#8197—DYNAMIC PILLOW SPEAKER, 10,000 ohm imp. with volume control cord	SDM-7
#4500—MAGNETIC PILLOW SPEAKER, 128 ohm imp.	SMV-2
#4530—MAGNETIC PILLOW SPEAKER, 2000 ohm imp.	SMY-2
#4501—MAGNETIC PILLOW SPEAKER, 128 ohm imp. NO CORD	SMV-01
#4531—MAGNETIC PILLOW SPEAKER, 2000 ohm imp. NO CORD	SMY-01
#7346—Volume Control Cord, MAGNETIC ONLY, 128 ohm imp.	VVM-2
#7844—Volume Control Cord, MAGNETIC ONLY, 2000 ohm imp.	VYM-2
#9239—Volume Control Cord, DYNAMIC ONLY, 10,000 imp.	VMD-2

TV LISTENER

Youngsters can view TV without disturbing family. Also ideal for institutions and hard-of-hearing. Two can use at the same time. Switch to turn TV speaker on or off, volume control, and 15′ cord included. Child can use easily and safely.

Stock Number	Catalog Number
#9900—LISTENER, complete, one Earset	LCP-90
#9338—Extra Earset, cord & plug	ELV-98

MEGAPHONE

Available with pocket type or collar type alligator clip. The Telex Megaphone can be used with any Standard Miniature earphone. Ideal for transistor radios either in personal entertainment or commercial communication. Presently in use by law enforcement agencies and other two way radio applications.

Stock Number	Catalog Number
#18301—Pocket Type	AEH-1
#18309—Collar Type	AEH-9

MICROPHONE

Reliable, field tested, heavy duty microphone with push-to-talk switch is especially adaptable to applications in Civil Defense, law enforcement, emergency services, search and rescue, durable construction, inter-plane or aircraft radio communications. Microphone is single button, carbon type N-1, identical to telephone switchboard headsets. Fits operator's hand comfortably, and light button pressure eliminates hand fatigue even through day long use. Sensitivity 1000 cycles is 30 db above one inVin a 20 ohm resistive load at sound pressure of 115 db. Button current 75 ma recommended 150 ma max. Single pole, single throw switch is normally open. Three foot cord with tinned leads, no connector.

	Stock Number	Catalog Number
Part Numbers	#18430	MCS-1

earsets

Modern, miniature earphone that slips on the ear. Unlimited single phone applications including transcribing, phone order, lab, record shops, dispatching, multiple listening, transistor radios, etc. Uses one ear leaving the other free. This sealed unit weighs ½ oz. and will fit any ear. Available with plastic or slim, plastic-covered metal earframes. Standard phone plug and 5′ cord included.

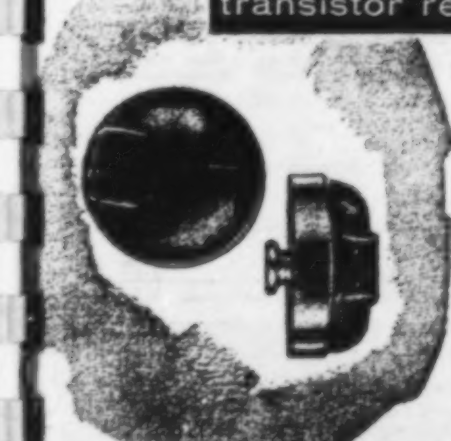
	Stock Number — Catalog Number with PLASTIC earframe	Stock Number — Catalog Number with METAL earframe
EARSET, 15 ohm imp.	#18134—EPR-2	#18092—EMR-2
EARSET, 128 ohm imp.	#18096—EPV-2	# 9334—EMV-2
EARSET, 1000 ohm imp.	#18058—EPX-2	# 9335—EMX-2
EARSET, 2000 ohm imp.	#18138—EPY-2	#18140—EMY-2
#12045—Volume Control Cord, 128 ohm imp.		VVT-2
#12046—Volume Control Cord, 1000 ohm imp.		VXT-2

STANDARD AND DELUXE TELETHIN® TRANSISTOR RADIO EARSETS

Engineered in the great tradition of Telex quality. Provides a measurably flatter response than other similar units. Weighs less than an ounce complete with flex-tested three-foot cord and earloop. Price of Standard Earset is competitive with foreign imports. Earsets are packaged individually in pocket-size "jewelite" plastic boxes—6 Standards or 4 *Telethins* to a merchandise display carton. Models to fit *all* transistor radios.

	Admiral	Arvin	Bulova 900B	Dewald	Emerson	G.E. [illegible]	G.E. [illegible]	G.E. [illegible]	G.E. [illegible]	G.E. [illegible]	Hoffman	Magnavox	Motorola	Packard-Bell	Philco	RCA	Regency	Roland	Sentinel	Sonora	Spartan	Travler	Western Auto	Westinghouse	Zenith	Catalog Number
TELETHIN assorted box of 4 18315																										ETR-90
18116	X	X		X							X		X		X	X	X	X				X	X		X	ETR-92
18117					X		X		X	X					X									X		ETR-93
18118						X		X																		ETR-94
18120			X									X						X	X	X						ETR-95
STANDARD assorted box of 6 18684																										ESR-90
18681-	X	X	X								X		X		X	X	X	X	X			X	X		X	ESR-92
18682-					X		X		X	X					X									X		ESR-93
18683						X		X																		ESR-94
18680			X									X		X				X	X	X						ESR-95

transistor receiver



This transistor receiver is designed for use in portable radios, paging systems, and other miniature audio applications. Sensitivity is 118 db above .0002 dynes per sq. cm. at 1 milliwatt of power at 1000 cycles. Maximum power recommended: 25 mw. Weighs only ¼ oz. and measures ⅓″ x 13/16″. Can be used with a variety of cords available from Telex.

Stock Number	Catalog Number	IMPEDANCE	D.C. RESISTANCE	MAX. D.C. CURRENT W/O POLARIZING
7688-R4	RTR-04	15	5	30 MA
7692-V4	RTV-04	128	27	12 MA
7694-W4	RTW-04	500	115	6 MA
7696-X4	RTX-04	1000	200	4 MA
7698-Y4	RTY-04	2000	500	2 MA

acoustical shell

Used for years in international government and diplomatic meetings, the TELA-EAR acoustic shell when used with Telex earsets is also popular for churches, dictation, phone order, lab work, record stores, and multiple listening systems. Sanitary shield transmits sound to ear without receiver touching it. Fits either ear—leaves the other free for phone or conversation. Weighs less than 1 oz.

Stock Number	Catalog Number
#18013 Shell only (order EP or EM Earsets separately)	AEM-2

Appendix J

side, in the region of the junction between two segments.

To allow the maximum flexibility, the internal bores of the segments may be widened at one or both ends as shown at 9.

The greater the tension of the spring 8, the greater the friction between nesting faces of adjacent segments and the better does the duct retain the shape into which it is bent.

Fig. 2 shows a part of a segmented duct using axially shorter segments which enable smoother bends to be made. Corresponding items in the figure and in Figs. 1 and 3 are given the same reference numerals.

In Fig. 3 segments even shorter than those of Fig. 2 are shown and in addition each segment has a circumferential rib 10 at the concave end which stiffens this end to resist any tendency for it to open out under the endwise pressure of the spring forcing the convex end of the adjacent segment into it. The rib also limits the bending movement of segments relative to one another which has certain advantages when sharp bends are made since any tendency for one pair of segments to take more than its fair share of the angular displacement is resisted.

The shorter the segments, the less tendency there is to trap the spring and the opening of the ends of the bores of the segments may be omitted. As there is also less tendency for the trapping of the spring to limit the relative movement of the segments, it is sometimes necessary to have ribs such as 10, for this reason alone.

The relative movement of segments must not be allowed to reach the point at which the bore of one segment is uncovered by the adjacent segment allowing the duct to leak to the surrounding air.

In Fig. 3 the spring 7 is shown in outline only by parallel dotted lines 7'.

The acoustic characteristics of acoustic ducts are such that sounds passing down them are subjected to amplitude frequency distortion, that is to say some frequencies are boosted and others attenuated. This effect grows with a shortening of the duct and *vice versa*.

When, for any length of duct, this distortion cannot be tolerated, it may be considerably minimised by introducing acoustic resistance into the duct.

When ordinary flexible stay-put tubing is used for the duct, resistance may be introduced into the bore in a variety of ways such as packing with wadding or inserting a roll of fine gauze. If wire gauze is used the flexibility of the tube is somewhat impaired and the gauze must be placed where sharp bends are not required.

It has been found in the case of segmented ducts of the type shown in Figs. 1, 2 and 3, that this resistance can be furnished by the spring 7 if it is of the correct form.

The best results are obtained if the spring is smaller in over-all diameter than the internal bore of the segments so that air waves pass along the spring inside and outside. The closer the coils of the spring, the greater the resistance so long as they are not actually touching one another. The resistance is caused by skin friction of the air in passing over the surface of the spring coils and anything which increases the area of this surface increases the acoustic resistance.

It is known, in an operator's headset to use a miniature microphone mounted on an adjustable boom secured to the receiver or to the end of the head harness opposite to the one to which the receiver is secured. It is difficult with this arrangement to avoid disturbing the adjustment of the boom when the head is moved due to the inertia of the microphone.

It is now proposed to fix the microphone to the head harness and extend the sound inlet by means of a flexible duct terminating in a flare opposite the mouth. Fig. 4 shows this arrangement with a segmented duct.

The duct must be flexible so that it can be adjusted to suit the individual operator and it must be of the "stay-put" type so that it will retain its adjustment. Unless the duct is made of light weight materials, it is liable to lose its adjustment in the same way as the boom-mounted microphone, when the head is moved. Most commercial flexible metallic tubing of the stay-put type is apt to be objectionable on this score and a special lightweight tubing should be used. On the other hand a segmented duct made in the manner described above can be made very light especially if suitable materials are used. Polyethylene has been used successfully.

In an operator's headset of this type the amplitude/frequency distortion due to the duct may be damped as mentioned above by the introduction of wadding, gauze of the like into the duct, if it is of ordinary flexible tubing, but if a segmented duct of the types described, is used adequate damping is provided by the presence of the tensioning spring. For some requirements additional damping may be necessary and it could be introduced into the air passages of the microphone with which the duct communicates. A roll of fine wire gauze answers this purpose well

Ex. App. 705